CHAPTER 2
BACKGROUND

FINAL
ENVIRONMENTAL
IMPACT STATEMENT

Brightwater
Regional Wastewater
Treatment System

VOLUME 1

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Chapter 2
Background

This chapter establishes the historical and planning context for King County's decision to site and build the Brightwater Regional Wastewater Treatment System. The first section summarizes King County's existing wastewater system, including a brief history of how the regional system came about. The next section summarizes the planning process that led to the adoption of the Regional Wastewater Services Plan (RWSP), a 30-year capital improvement plan that identifies the regional need for Brightwater and many other regional capital facilities. The following section describes how the Brightwater alternatives described in this Final EIS were developed using adopted policy site screening and site selection criteria. The chapter also describes the environmental review of alternatives and the manner in which conveyance and outfall alignments were refined and portal siting areas were identified and screened. Also described are the public involvement activities and the process for siting essential public facilities. References and figures cited within this chapter can be found at the end of the chapter.

2.1 Existing Wastewater System

This section provides a brief history of wastewater treatment in King County, a description of the regional wastewater service area and customers, and an overview of the regional wastewater system that is owned, operated, and maintained by King County. Brightwater is a key step in the continued development of the regional system.

2.1.1 History

In 1911, the City of Seattle completed the Fort Lawton Tunnel, which was constructed to discharge untreated wastewater flows offshore of West Point (Discovery Park) into Puget Sound. Early wastewater systems, which were the beginning of the current system in the City of Seattle, were built to collect wastewater from homes and businesses and runoff from streets to carry away horse manure and litter. These systems are called "combined systems" because they collect both sanitary sewer and stormwater flows.

By the 1950s, more than 28 small wastewater treatment plants had been built in the Seattle metropolitan area. Most of these served suburban areas where the collection and discharge of sanitary sewer and stormwater flows are separate; only a few plants served areas with combined wastewater and stormwater systems. In addition, the treatment plants did not serve all communities, and untreated wastewater entered Lake Washington and Lake Sammamish as well as Elliott Bay, the Duwamish River, the Lake Washington

Ship Canal, and Puget Sound off of Discovery Park in Seattle. By the late 1950s, about 40 million gallons of untreated wastewater were discharged daily off of Discovery Park alone.

The degradation of water quality in Lake Washington and concern about the future of other bodies of water led to the formation of a grassroots citizens committee. The committee successfully sponsored state legislation to enable formation of a municipal corporation to manage the wastewater pollution problem for the Seattle metropolitan area. This effort resulted in the formation of the Municipality of Metropolitan Seattle (Metro) by a vote of citizens in 1958. In 1959, the Metro Council, comprised of elected representatives and appointees from local cities and sewer districts, assumed responsibility for cleaning up Lake Washington and establishing a regional wastewater system.

A comprehensive wastewater disposal and stormwater drainage plan for Metro (Metro, 1958) was adopted by the newly created Metro Council in 1959. The plan became the core planning document for wastewater treatment services in the Lake Washington drainage basin, which includes most of the Seattle/King County region within the Urban Growth Area, a portion of Snohomish County, and a small portion of Pierce County, for the subsequent 35 years. This plan has been amended periodically to reflect significant changes and still serves as the adopted King County regional wastewater services plan.

In 1961, Metro entered into a series of agreements with local sewer service providers to accept and treat wastewater collected in their systems and to own and operate the regional pipelines, pump stations, and treatment plants to serve Seattle and suburban King County. By 1967, Metro also had agreements with two local providers in Snohomish County. At that time, the City of Seattle's system was the only combined system, carrying wastewater as well as stormwater runoff. Relief points had been built into the system to allow for overflows into area waterways when storms inundated the system. All other local wastewater systems were and are separated from stormwater conveyance systems.

Seattle constituted 90 percent of the customer base for the new Metro, and therefore 90 percent of the ratepayer base, providing the financial capability to construct the major wastewater facilities to serve the region. Metro, in turn, accepted responsibility for handling 37 of Seattle's combined sewers.

Studies conducted by Metro in 1958 and 1986, and in 1995 as part of the RWSP, concluded that a system with large central facilities was more cost effective to build and operate than a system with many small plants. With the startup of the South Treatment Plant in the City of Renton in 1965 and the West Point Treatment Plant in the City of Seattle in 1966, along with the construction of major trunk lines and pump stations needed to convey wastewater to these regional plants, Metro began closing 28 small treatment plants and eliminating 46 wastewater discharge points into Lake Washington and Lake Sammamish. Metro continued to operate three small treatment plants at Alki, Carkeek Park, and Richmond Beach, which served small basins that drained into Puget

Sound. Overflows of untreated wastewater during the dry season were eliminated, and the discharge of treated wastewater to the Lake Washington drainage basin was brought to a halt.

By the late 1960s, Lake Washington's water quality had improved dramatically, and the independent action of citizens in the King County area to invest in protecting their water resources was gaining national recognition. The King County area was held as a model nationwide of citizen action in cleaning up the environment. The success of the 1960s was not the end of efforts to protect water resources. Much work has been done since then to improve wastewater treatment and reduce combined sewer overflows. That work, along with the original construction of a regional system in the 1960s, has amounted to nearly $4 billion in capital investment in protecting public health and water resources in the Seattle/King County region.

In January 1994, King County, in accordance with state legislation, assumed Metro's regional responsibilities and decision-making authority to adopt regional wastewater plans and to site, construct, and operate regional wastewater facilities. In this regional role, King County adopted the Regional Wastewater Services Plan in 1999 and is now implementing the regional plan, in part through the siting and construction of the Brightwater facilities by the year 2010.

2.1.2 Regional Service Area

The area served by the regional wastewater system includes portions of King, Snohomish, and Pierce Counties (Figure 2-1). The service area is divided into west and east sections, depending on which treatment plant treats the wastewater. In general, the West Point Treatment Plant receives wastewater from the West Service Area, and the South Treatment Plant receives wastewater from the East Service Area. Occasionally, during summer, flows from the East Service Area are directed to the West Point Plant based on plant and conveyance capacity as well as costs to convey (e.g., pump) and treat the wastewater.

2.1.3 Regional Wastewater Customers

King County provides wholesale wastewater services to 18 cities and 15 water and sewer districts in the wastewater service area (Table 2-1). These entities, located in King and Snohomish Counties[1], are collectively termed "local agencies." King County bills the local agencies based on the number of "residential customer equivalents" (RCEs)[2] in their districts, and the local agencies in turn bill their customers. King County has wastewater

[1] In the year 2000, wastewater was collected from 107,000 residents in Snohomish County
[2] One RCE equals 750 cubic feet of water usage daily.

disposal agreements with each of the 33 local agencies. These agreements extend through July 1, 2036. The local agencies are listed in Table 2-1.

Table 2-1. King County's Wholesale Wastewater Customers

Alderwood Water and Sewer District[a]	Northeast Sammamish Sewer and Water District[a]
City of Algona	Northshore Utility District[a]
City of Auburn	City of Pacific
City of Bellevue[a]	City of Redmond[a]
City of Black Diamond	City of Renton
City of Bothell[a]	Ronald Wastewater District[b]
City of Brier[a]	Sammamish Plateau Water and Sewer District[a]
City of Carnation	City of Seattle
Cedar River Utility District	Soos Creek Sewer and Water District
Coal Creek Utility District	Skyway Water and Sewer District
Cross Valley Water District[a]	City of Tukwila
The Highlands	Val-Vue Sewer District
City of Issaquah	Vashon Sewer District
City of Kent	Woodinville Water and Sewer District[a]
City of Kirkland	Town of Woodway[b]
City of Lake Forest Park[a]	
Lakehaven Utility District	
City of Mercer Island	

[a] Customers that will be served, all or in part, by the Brightwater Treatment Plant.
[b] King County has an agreement with the City of Edmonds for treatment by Edmonds of sewage from King County's Richmond Beach service area, which includes the Town of Woodway and portions of the Ronald Wastewater District. In exchange, King County will treat an equivalent amount of wastewater from the Edmonds service area.

2.1.4 Regional Wastewater System

King County's wastewater system consists of two large wastewater treatment plants, a small treatment plant on Vashon Island, two combined sewer overflow treatment plants, 42 pump stations, 19 regulator stations, 330 miles of conveyance pipe, and outfalls for each of the treatment plants (Figure 2-1). Wastewater generated from local homes and businesses flows into relatively small-diameter pipes called laterals. Laterals are owned and maintained by the local agencies. The many laterals connect to the large county-owned trunks and interceptors, which are the main pipes used to convey wastewater to the regional treatment plants as well as to store wastewater during high flows for later treatment. For example, the storage facility connected to the Kenmore Interceptor can store in excess of 4 million gallons of wastewater. Wastewater is primarily conveyed by gravity, though in some locations wastewater must be pumped using pump stations. The regional conveyance system on the mainland transports wastewater to the two large treatment plants—the West Point Treatment Plant near Puget Sound west of Discovery Park in the City of Seattle and the South Treatment Plant in the western part of the City of Renton. The conveyance system on Vashon Island transports wastewater to a small

treatment plant northeast of the Town of Vashon. The three treatment plants provide primary and secondary treatment, which removes about 85 to 95 percent of the solids and organics from wastewater.

In 1995, the West Point Treatment Plant was upgraded to secondary treatment, providing capacity for an average wet-weather flow of 133 million gallons per day (mgd) and a peak hydraulic capacity of 440 mgd. The South Treatment Plant was expanded in 2001 to provide capacity for 115 mgd of average wet weather flow and 325 to 360 mgd of peak flow, depending on tidal conditions. Today, both plants provide secondary treatment for an average of approximately 210 mgd.

The King County wastewater system also includes 38 combined sewer overflow (CSO) outfalls. In the City of Seattle, most of the sewers collect rainwater (stormwater) in addition to sanitary sewage (the water from flushed toilets, showers, sinks, washing machines, and other wastewater sources). During storms, the flows in these combined sewers can exceed the capacity of conveyance pipes. When this happens, untreated flows discharge directly from CSO outfalls to nearby water bodies. Combined sewer overflows are discussed in more detail later in this chapter.

2.2 Wastewater Treatment Processes

This section provides an overview of the liquids and solids wastewater treatment process, as well as a discussion of odor control and an overview of the regulations that govern these processes.

2.2.1 Liquids Treatment

The liquids component of wastewater treatment involves six steps: preliminary treatment, primary treatment, secondary treatment, advanced treatment of a portion of the flow to produce reclaimed water, disinfection, and effluent discharge. Each is summarized below.

2.2.1.1 Preliminary Treatment

Preliminary treatment involves the physical removal of pollutants through screening and settling. Upon reaching the treatment plant, raw wastewater flows through bar screens that remove large objects such as cans, rocks, sticks, and rags. After screening, the wastewater is sent to primary clarifiers, which slow the velocity of the wastewater and allow heavy material such as sand and grit to settle out. This material is trucked to a landfill for disposal.

2.2.1.2 Primary Treatment

Primary treatment further removes suspended solids and floating material in the wastewater. Following preliminary treatment, wastewater is sent to larger settling tanks called primary clarifiers. These tanks further slow the flow of wastewater to allow approximately 60 percent of the suspended materials to settle out. Skimmers are also used to remove oil, grease, and other floating pollutants. This treated water, called primary effluent, is then routed to the secondary treatment process. The proposed Brightwater System would use conventional primary treatment as well as an advanced primary process called ballasted sedimentation that will handle a portion of the peak flows to the treatment plant. Ballasted sedimentation works by adding a combination of coagulants and polymers to the primary effluent. The chemical agents cause the suspended solids in the effluent to flocculate (aggregate together) and settle out. This process achieves higher solids and biological oxygen demand removal rates than conventional primary clarifiers.

2.2.1.3 Secondary Treatment

Whereas primary treatment relies on settling to remove coarse suspended material, secondary treatment uses aerobic bacteria to consume the fine organic material in solution. The bacteria are called "aerobic" because they need oxygen to survive. Under conventional secondary treatment, primary effluent is directed to large aeration tanks where oxygen is bubbled through the wastewater to stimulate the growth of bacteria that consume and digest biodegradable pollutants. The combination of digested material along with the bacteria, called mixed liquor, then flows into large tanks called secondary clarifiers. Here, the mixed liquor is detained for 4 to 8 hours to allow the bacteria and other fine material to settle out, producing a clarified secondary effluent.

Brightwater would use an alternative secondary process called membrane bioreactors, or MBR. This process filters wastewater with microporous membranes that filter out particulate matter and even individual bacteria. The result is treated wastewater that is seven to 10 times cleaner than typical secondary-treated wastewater, which already meets current environmental requirements for discharges into Puget Sound. For example, 36 million gallons of the treated wastewater discharged daily from Brightwater using membrane technology would contain the same amount of pollutants as only 5 million gallons of treated wastewater from a conventional secondary treatment plant.

The optimum use of MBR technology at Brightwater is to employ a split-flow concept in which the average wet-weather flow (AWWF) is treated using MBR and sustained flows in excess of the AWWF are routed to the ballasted sedimentation process described previously. The enhanced primary effluent is then blended with the MBR effluent and disinfected prior to discharge. Because sustained flows in excess of AWWF occur infrequently and generally for short durations, this split-flow concept will result in an annual effluent quality that is substantially better overall than conventional secondary treatment.

2.2.1.4 Advanced Treatment

Advanced treatment is a higher level of treatment of secondary effluent to produce reclaimed water for irrigation, tank cleaning, and other onsite processes that do not require potable water. The reclaimed water may be distributed offsite also at some time in the future. Brightwater would produce "Class A" reclaimed water, which meets the Water Quality Standards defined by the State of Washington. The secondary effluent from the MBR process would meet most of the Class A requirements, though additional disinfection would be needed to meet coliform limits for Class A water. Ultraviolet light would provide the additional disinfection at either of the alternative treatment plant sites. Sodium hypochlorite may also be added in the distribution system to prevent biological growth in the system.

2.2.1.5 Disinfection

The purpose of disinfection is to kill remaining pathogens in the treated effluent to a level that complies with discharge permit conditions. Conventional disinfection processes have typically used chlorine. Chlorine is effective, but, if accidentally released into the atmosphere, it can spread beyond the boundaries of the facility. Other safer and equally effective alternatives include sodium hypochlorite (essentially household bleach) and ultraviolet light, each with its own advantages and disadvantages. Sodium hypochlorite is cost effective but requires more room for chemical storage and contact channels. Ultraviolet light requires less space but is more expensive due to equipment and operating costs.

After evaluating these factors, sodium hypochlorite was selected as the preferred method of disinfection for MBR effluent and advanced primary effluent at the Route 9 site. (Advanced primary effluent has undergone ballasted sedimentation. See the Primary Treatment discussion.) The effluent tunnel from the Route 9 site to Puget Sound will provide the necessary contact time to achieve discharge requirements for disinfection and negates the need for onsite contact channels. This reduces the space requirements for disinfection at Route 9. At the Unocal site, the shorter effluent line prior to discharge does not provide sufficient contact time to meet discharge requirements; therefore, ultraviolet light was selected for the MBR flow. Peak flows receiving advanced primary treatment would be disinfected with sodium hypochlorite and contact channels would be provided on the Unocal site for peak flow treatment.

2.2.1.6 Effluent Discharge

At King County's existing treatment plants, effluent is discharged into pipelines that lead to deep outfalls in Puget Sound. Outfalls are essentially underwater pipelines with a perforated section at their end (termed a diffuser) that mixes the effluent with the receiving waters. In the case of Brightwater, the receiving water is Puget Sound. The Brightwater outfall will be sited and designed to provide strong mixing and dilution of

the effluent, meeting water quality standards and protecting the health of Puget Sound. At the Unocal site, an effluent pump station would be required to pump the effluent to Puget Sound for discharge. At Route 9, the outfall and diffuser system would be the same as the Unocal site, but plant effluent would flow by gravity from the Route 9 site to Puget Sound. No pump station would be required due to the elevation of the Route 9 site in relation to Puget Sound. The outfall location for Route 9 is located off Point Wells in Richmond Beach; for Unocal, the outfall is located off Point Edwards in Edmonds.

2.2.2 Solids Processing

Each stage of the liquids treatment process generates solids that must be treated or, in the case of preliminary treatment (screening and grit removal), trucked to a landfill for disposal. Solids collected from the primary and secondary treatment processes—termed sludge—are processed using a three-step process of thickening, digestion, and dewatering.

2.2.2.1 Thickening

The thickening process removes water from the primary and secondary sludge prior to anaerobic digestion. Typically, primary sludge is approximately 1 to 2 percent solids and secondary sludge around 0.5 percent solids. Using technologies such as dissolved air flotation (South Treatment Plant) or gravity belt thickeners (West Point Treatment Plant) the sludge is thickened to approximately 6 percent solids content. Like West Point, the Brightwater Plant will use gravity belt thickeners to thicken solids for digestion.

2.2.2.2 Anaerobic Digestion

After thickening, the sludge is conveyed to large tanks called digesters. The sludge remains in the digester for 2 to 3 weeks, undergoing a biological treatment process by anaerobic bacteria that can tolerate oxygen-free conditions. Anaerobic digestion stabilizes the sludge until the prescribed rate of pathogen die-off has been achieved to produce biosolids that meet “Class B” regulatory requirements. (Class B biosolids can be applied as fertilizer to forest and agricultural lands with an initial period of limited public access.) Digestion converts approximately one-half of the organic solids volume to carbon dioxide and methane gas, which is collected and used to run pumps, generate electricity for sale to Seattle City Light, or produce pressure for plant operations (West Point Treatment Plant), or it is sold to Puget Sound Energy (South Treatment Plant).

Like the West Point and South Treatment Plants, the Brightwater Treatment Plant would use anaerobic digestion to produce a minimum of Class B biosolids. King County may also elect to produce higher quality Class A biosolids in the future using a modified thermophilic-mesophilic anaerobic digestion system. (Class A biosolids can be applied to

lands with unlimited public access.) Should King County proceed with Class B anaerobic digestion, the digester complex would be configured so that it could be upgraded to a Class A digestion process in the future.

2.2.2.3 Dewatering

The digested sludge (biosolids) is then dewatered using a physical process, such as a belt filter press or a centrifuge, to further remove water from the solids to reduce volume. The resulting "biosolids cake" is approximately 18 to 28 percent solids content. King County recycles 100 percent of all biosolids produced, some 130,000 wet tons each year, for use as a soil amendment for forest or agricultural lands or composted into a soil mix. The Brightwater plant would use centrifuges for dewatering in an enclosed building for odor control. An enclosed truck bay would also be provided for loading the dewatered biosolids into hauling vehicles.

2.2.3 Odor Control

Controlling odors from the wastewater treatment process is a priority for King County. To remove odors at Brightwater, all process units would be fully enclosed, including the influent wet well, screenings and grit handling, primary clarifiers, aeration basins and membrane tanks, and disinfection. Buildings such as headworks and solids handling (thickening and dewatering processes) would have the process air and equipment fully enclosed. Air collected from these process units would be routed to one of five odor control systems:

- Influent pump station
- Headworks and primary treatment
- Secondary treatment and disinfection
- Solids handling building and biosolids truck staging
- Digester gas pressure relief emergency vents (carbon only)

Except for digester pressure relief, each odor control system would treat the process air using multistage chemical scrubbers followed by a final polishing stage of carbon adsorption. Each stage would treat the process air to a greater degree. The exhaust air from the carbon polishers would be discharged to the atmosphere. Any digester gas that may be discharged through pressure release vents would be treated in carbon scrubbers.

2.2.4 Regulations Governing Treatment

The primary regulation that governs the treatment of wastewater is the federal Clean Water Act (CWA), a 1977 amendment to the Federal Water Pollution Control Act of 1972. The CWA establishes the basic structure for regulating discharges of pollutants into surface waters of the United States. The U.S. Environmental Protection Agency has delegated authority to administer the CWA to the Washington State Department of Ecology (Ecology). Ecology is the government agency that ensures that water quality standards and requirements are met in the State of Washington.

One method that Ecology uses to regulate the discharge of effluent into the waters of the State of Washington and to ensure wastewater treatment agencies are meeting Water Quality Standards is the issuance of National Pollutant Discharge Elimination System (NPDES) permits. Permits condition discharges to comply with surface water quality standards for specific receiving water classes and include specifications on effluent limits, testing, and conditions for monitoring and reporting. Each of King County's treatment plants has an NPDES permit. Applications for renewal must be submitted every 5 years.

The requirements in King County's NPDES permits drive the design and operation of treatment processes and facilities used at the treatment plants. The permits are developed based on federal and state water quality standards and include specific conditions for each treatment plant and outfall. Permits also establish requirements for preliminary treatment of influent, quality of effluent discharged, size of mixing zones, monitoring and reporting, and combined sewer overflow treatment and control.

Biosolids treatment and use are regulated under federal rule (40 CFR Part 503) and under Washington State rule (Chapter 173-308 WAC) through the Statewide General Permit for Biosolids Management. Solids that do not meet the definition of biosolids (such as screenings or grit) are regulated under the NPDES permit.

2.3 Wastewater Programs and Services

In addition to the wastewater treatment facilities described above, the King County Wastewater Treatment Division implements or supports many programs and services to further its mission of safeguarding public health, preserving and enhancing the environment, meeting regulatory requirements, and recycling the byproducts of wastewater treatment. Some of these programs are described below.

2.3.1 Combined Sewer Overflow Program

In some parts of the West Service Area, wastewater and stormwater are collected and conveyed in separate pipes; in other parts, wastewater and stormwater are collected and

conveyed in the same pipes, termed combined sewers. In the early 1960s, nearly 30 billion gallons of combined sewage was released annually into receiving waters. Since then, King County has constructed treatment plants and implemented combined sewer overflow (CSO) control programs that have reduced the volume of overflows to approximately 1.5 billion gallons per year.

During normal conditions, up to 300 million gallons per day (mgd) of combined sewage is conveyed to the West Point Treatment Plant where it receives full secondary treatment. During large storm events, the plant provides primary treatment and disinfection of combined peak flows that exceed 300 mgd, up to a maximum of 440 mgd. When there is too much combined wastewater and stormwater for the system to handle, excess flows are directed to either overflow outfalls or to one of two CSO treatment plants. There are 37 CSO outfalls in the King County system (Figure 2-2). They discharge into Lake Washington, the Ship Canal, the Duwamish River, Elliott Bay, or Puget Sound. The CSO treatment plants, located at Alki Point and Carkeek Park in Seattle, provide primary treatment of combined sewage and then discharge the primary effluent to Puget Sound. These two plants treat combined sewage only from relatively small, nearby parts of the combined sewer system. All other excess flows of combined sewage are conveyed to the CSO outfalls.

The Washington State Department of Ecology allows for an average of no more than one untreated discharge per year per CSO (WAC 173-245). CSOs that meet the requirement are referred to as "controlled." Those that do not meet the standards are referred to as "uncontrolled." Thirteen of King County's CSOs, including Alki and Carkeek, were controlled to the state standard as of late 2000, and one additional CSO (Harbor Avenue) was controlled to state standards in 2001. Five more CSOs (Henderson Street, Martin Luther King Way, Dexter Avenue, Denny Way, and Norfolk Street) will be controlled prior to 2005.

Under the Regional Wastewater Services Plan, the remaining CSOs will be upgraded to meet state standards between 2009 and 2030. In the meantime, King County is preparing its 5-year CSO Plan Update, due in 2005. The CSO Plan Update will describe King County's progress on its CSO program and identify its program for the following 5 years. The CSO Plan Update is based on a program review, now underway, which considers elements such as how to maximize use of existing CSO control facilities and ensure that projects are in compliance with new regulatory requirements and objectives such as the Endangered Species Act.[3] There will be no CSOs in the Brightwater Service Area.

[3] For the status of the Regional Wastewater Services Plan (RWSP) CSO Control Program, see June 2003 *Regional Wastewater Services Plan Semi-annual Report.* This and other RWSP progress reports are available in the library section of the RWSP Web site at http://dnr.metrokc.gov/wtd/rwsp/rwsp.htm.

2.3.2 Regional Infiltration and Inflow Control Program

Since the 1950s, when agencies began separating stormwater and wastewater into different systems, wastewater conveyance pipes have not been designed to carry large amounts of stormwater or groundwater from other sources; nevertheless, a substantial amount of stormwater and groundwater enters the pipes through infiltration and inflow (I/I). "Infiltration" refers to stormwater and groundwater that enter the wastewater system through cracked pipes and leaky joints. "Inflow" refers to stormwater that enters the system directly through manhole covers or through downspouts that have been improperly connected to the wastewater system.

Infiltration and inflow into the regional trunks and interceptors maintained by King County represents only about 5 percent of the total amount entering the system. The remaining 95 percent originates in collection systems owned by the local agencies. These local systems comprise more than 5,000 miles of relatively small-diameter pipes with many joints and connections, which increase the likelihood of I/I. Approximately 50 percent of the I/I is estimated to come from leaks and cracks in the sewerlines and roof drains into the sewerlines that connect homes and businesses to the public sewers.

The high flows that result from excessive I/I are expensive to handle. King County is required by wastewater disposal agreements to accept the wastewater flows sent by local service providers to the regional system. This requires pipelines and treatment plants to be built large enough to accommodate the high flows resulting from I/I even though this maximum capacity is not needed all the time. Studies from around the country show that controlling I/I can be cost-effective. However, local agencies generally have not had the resources to address excessive I/I in their systems.

As part of the Regional Wastewater Services Plan, King County began the comprehensive 6-year Regional Infiltration and Inflow Control Program to identify sources of I/I into local sewer systems. The study is based on a cooperative partnership between King County and the 33 local agencies serving areas in King County and portions of Snohomish County. The primary goal of the program is to define current levels of I/I within each local agency, determine how much I/I is cost-effective to remove, and develop a plan for the long-term control of increased I/I into the service area and regional system.

One important component of the first phase of the I/I program is to implement pilot rehabilitation projects in the local sewer systems to demonstrate the effectiveness of I/I controls. The King County Council approved the listing of pilot projects in April 2003, and the Metropolitan Water Pollution Abatement Advisory Committee (MWPAAC) selected 10 pilot projects from the list for implementation. Design work for the pilot projects was completed in May 2003 and notice to proceed for rehabilitation was issued in July. All the pilot projects will be substantially completed by the end of 2003. King County will monitor flows during winter 2003–2004 to evaluate the I/I removal effectiveness of the pilot projects. The results of this monitoring will be used along with the modeling results to establish the effectiveness of the rehabilitation efforts.

2.3.3 Industrial Waste Program

King County implements an Industrial Waste Program consistent with the requirements of the Clean Water Act. The Industrial Waste Program requires certain commercial and industrial wastewater customers to pretreat wastewater before discharging it into the wastewater system. Standards and limits are established to protect wastewater facilities and treatment processes, public health and safety, and receiving waters. Businesses must comply with federal, state, and local limits on pollutants. Regulated pollutants include heavy metals such as arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc; flammable materials such as gasoline, kerosene, naphtha, benzene, toluene, and sulfides; cyanide; and organic compounds such as solvents, cleaners, thinners, pesticides, and laboratory chemicals. The program has resulted in a major decline of undesirable chemicals in wastewater received by King County treatment plants since the program began in 1969.

King County implements its pretreatment program through waste discharge permits and authorizations to industrial users. The Industrial Waste Program issues wastewater discharge permits and discharge authorizations to companies that have industrial processes with the potential to adversely affect King County treatment facilities. The Industrial Waste Program includes regular compliance monitoring and inspection of permittees; enforcement through notices of violation, compliance orders, fines, and a semi-annual publication of violators; and a recognition and awards program for high level compliance.

In addition to monitoring authorized discharges by businesses, the Industrial Waste Program monitors pollutant levels at other locations throughout the wastewater collection system. Heavy metal and other pollutant levels are measured and analyzed. The ongoing data collection allows staff to determine the range of pollutant concentrations over time. When heavy metals or other pollutants are detected at unusually high concentrations, staff often can determine the approximate direction from which a pollutant is coming, track the discharge to its source, and take corrective action.

Implementation of King County's Industrial Waste Program has resulted in continuous improvements in water and biosolids quality and a decline in the concentration of heavy metals coming into the treatment plants.

2.3.4 Hazardous Waste Management Program

The regional Hazardous Waste Management Program complements the Industrial Waste Program by educating local residents and small businesses on ways to reduce hazardous waste and prevent water pollution. The program is a cooperative effort among the King County Department of Natural Resources and Parks, Public Health-Seattle and King County, Seattle Public Utilities, and 38 cities in King County and Snohomish County. It implements the Local Hazardous Waste Management Plan adopted in 1990 by King County and all the local cities.

Program staff visit small businesses throughout King County and all of its incorporated cities and observe operating practices. When problem materials, such as lead, mercury, and solvent-based paints, are being disposed of in the sanitary sewer, staff counsel the company on correct practices. When necessary, staff refer the matter to the Industrial Waste Program for regulatory action.

The program targets industry groups and geographic areas to provide technical assistance; provides vouchers to qualified businesses to help defray the cost of hazardous waste management and equipment upgrades; provides household hazardous waste education through a telephone hotline, publications, and public outreach; provides facilities for household and hazardous waste management and disposal; and responds to complaints about pollution incidents related to hazardous materials.

2.3.5 Biosolids Management Program

King County's South and West Point Treatment Plants produce about 130,000 wet tons of Class B biosolids annually—all of which is recycled.[4] For nearly 30 years, King County has supplied biosolids for application to commercial and public forest lands. In 1991, King County began supplying biosolids for agricultural uses in Eastern Washington. Revenues from these two markets allow King County to recover a portion of processing and distribution costs. King County encourages public-private partnerships for recycling biosolids. One example of such a partnership is the 1995 Biosolids Forestry Agreement with the Mountains to Sound Greenway Trust, the Washington State Department of Natural Resources, the Weyerhaeuser Company, and the University of Washington. This 50-year agreement provides for use of biosolids on working forests in King County to enhance wildlife habitat and generate long-term income from selective timber harvests.

The beneficial characteristics of biosolids make them highly sought after for forestry and agricultural applications. Biosolids production is expected to increase over time as wastewater flows increase. The volume of biosolids recycled on forest lands is not likely to significantly increase over current volumes; however, the market demand for biosolids is strong in dryland and irrigated agriculture, and current agricultural markets have indicated their interest in obtaining increased amounts of biosolids.

In the near term, King County will use anaerobic digestion to produce Class B biosolids at all its treatment plants. King County will continue to assess biosolids processing technologies that have the potential to improve biosolids quality, increase the efficiency of existing digesters, reduce truck traffic, and otherwise minimize the potential impacts of solids processing at the wastewater treatment facilities.

[4] Class B biosolids contain greatly reduced amounts of disease-causing microorganisms (pathogens) and can be safely applied to land with limited public access such as forest and agricultural sites. King County contracts with a local composter to produce a small amount of Class A biosolids (marketed as GroCo) that have no detectable pathogens and can be used for landscaping and home gardens.

2.3.6 Energy Recovery Program

Over the past several years, King County has experienced unprecedented increases in energy costs from suppliers of electricity and natural gas. King County recognizes the need to be more energy efficient as well as to develop new and environmentally responsible sources of energy to become more self-sufficient and independent from volatile energy markets. One source of energy related to the wastewater treatment process is digester gas—essentially methane produced from the solids digestion process. Digester gas is an environmentally sound, economic alternative to existing energy sources, and, if recovered, it can help to provide greater plant reliability and public safety.

Digester gas is currently being recovered at the West Point and South Treatment Plants. Engine-driven pumps that burn digester gas are used at West Point to pump influent into the treatment process and to generate electricity for other plant use. At the South Treatment Plant, the digester gas is cleaned to "pipeline" quality with liquid scrubbers using treated effluent; it is then sold to Puget Sound Energy. A 1-megawatt power plant is being installed at the South Treatment Plant to demonstrate the feasibility of using fuel cell technology to transform methane into electrical energy. At Brightwater, a cogeneration facility would be included at either alternative treatment plant site. The facility would provide sufficient power to run the entire treatment facility at average wet weather flow capacity.

2.3.7 Water Reuse Program

The goal of King County's Water Reuse Program is to use reclaimed water to help meet the water resource needs of this region's residents and the environment. Reclaimed water is wastewater treated to a level that allows it to be used safely and effectively for irrigation, industrial process water, and other non-potable applications.

King County currently produces reclaimed water at each of its regional treatment plants. For example, the South Treatment Plant produces approximately 0.7 mgd of reclaimed water to meet plant process, operation, and landscape irrigation needs. It saves about 200,000 gallons per day of tap water that otherwise would be needed. In addition, two distribution lines make the reclaimed water available for heating/cooling and irrigation in the immediate vicinity of the plant. Reclaimed water is also produced and used at the West Point Treatment Plant for plant processes and irrigation.

As part of the Regional Wastewater Services Plan, the King County Executive was required to prepare a detailed work plan, including tasks and schedule for the development of a water reuse program and a process to coordinate with affected tribal and local governments, the state, and area citizens. The Executive transmitted this plan (King County, 2000b) to the King County Council in December 2000, and it was recently approved. King County is also exploring other possibilities for reclaimed water, including the potential for developing small-scale facilities within the region to process untreated wastewater into irrigation-quality reclaimed water. King County has recently completed a

demonstration project at the West Point Treatment Plant to evaluate the effectiveness, operability, and cost of reuse-related treatment technologies.

The Brightwater Treatment Plant would initially produce 5 mgd of reclaimed water, with the capability to expand ultimate production to 54 mgd. This water would be available to offsite markets as they develop, but in any event would be used for onsite irrigation and process water.

2.3.8 Water Conservation Program

Under the Regional Wastewater Services Plan, the King County Council decided to implement a water conservation program to provide a holistic approach to water resource management and reduce impacts to the wastewater system. Specifically, an RWSP policy calls for King County to "support regional water supply agencies and water purveyors in their public education campaign on the need and ways to conserve water through pilot projects that support homeowner water conservation, emphasizing strategies and technologies that reduce wastewater." In 2001, King County began a 5-year, $1.5 million program in partnership with local water purveyors to audit publicly owned facilities and retrofit inefficient water fixtures with low-flow toilets, shower heads, and faucet aerators. This effort is saving millions of gallons of water each year.

2.3.9 Environmental Laboratory Services

The King County Environmental Laboratory is a fully accredited, state-of-the-art facility that provides a wide range of sampling and analysis services to the Wastewater Treatment Division. These services include initial sample design, sample collection, method development, analyses, and reporting of final results. Analyses performed include trace organic, trace metal, and conventional chemistry; sediment toxicity and whole effluent toxicity; and microbiological determinations for samples collected from wastewater, industrial discharges, biota, and waterbodies. In addition, the laboratory has a research vessel used for various types of marine and freshwater sampling.

2.4 Regional Wastewater Services Plan

This section provides the planning context for the adopted Regional Wastewater Services Plan, the regional policy basis for a $1.8 billion[5] capital improvement program that will provide wastewater services to this region for the next 30 years. The section begins with an overview of how King County projects regional wastewater flows based on population

[5] In 2002 dollars.

and employment forecasts and other factors. Supporting population growth and adopted growth management plans are key drivers of the RWSP. The remainder of the section deals with how the RWSP was developed, reviewed, revised, and adopted by the King County Council in December 1999.

2.4.1 Forecasting Population and Employment and Projecting Wastewater Flow

The Washington State Growth Management Act requires that capital facility plans project future facility needs. This requirement was the basis for the King County Comprehensive Plan, which established an Urban Growth Area (UGA). Within the UGA, King County must provide adequate services to serve population growth. The RWSP was developed to be consistent with the comprehensive plan and to ensure that wastewater facilities were available to serve growth in the multiple cities included within the King County Service Area, which includes portions of both Snohomish and Pierce Counties.

2.4.1.1 Methodology for Estimating Flows

To identify wastewater facilities needed in the future in its service area, the King County Wastewater Treatment Division projected future wastewater flows by first using population and employment forecasts provided by the Puget Sound Regional Council (PSRC). At the time the RWSP was being developed, PSRC forecasted population and employment growth through 2020. King County extended this forecast through 2050 by applying a linear trend function, essentially assuming that growth would continue at the same rate until 2050, when the area is expected to reach saturation conditions, the point where all sewerable land has been sewered and the area has reached its maximum population density.

In general terms, the method used for projecting future wastewater flows is to multiply population and employment forecasts by factors representing average volumes of wastewater generated per person, yielding a "base" sanitary flow. For example, past studies and measured sanitary flows show that the average residential customer generates approximately 60 gallons of wastewater per day. Commercial and industrial customers generate about 35 and 75 gallons per person per day, respectively.[6]

However, because wastewater facilities are designed to handle peak sanitary flows, additional factors must be applied to estimate the amount of groundwater and rainfall (referred to as infiltration and inflow, or I/I) entering the system. Peak flow is essentially base flow plus I/I. Accordingly, three I/I factors were applied to basins within the King

[6] For a detailed discussion of population and employment forecasts, see Chapters 6, 7, and 8 of *Wastewater 2020 Plus Existing Conditions*, Metro and HDR Engineering, 1994.

County Service Area to account for average dry-weather I/I, average wet-weather I/I, and peak I/I (Municipality of Metropolitan Seattle (Metro) and HDR Engineering, 1994). The factors were based on long-term rainfall data and a flow simulation from a 20-year storm (a rainfall event with an intensity and duration that occurs once every 20 years in this region). In addition, I/I estimates were increased by 7 percent by decade (noncompounded) through 2030 to account for deteriorating pipes, leaky joints from new connections, and other factors that typically increase I/I.

Applying these factors to the population and employment forecasts yielded flow projections that show that by the year 2040, King County will need an additional 74 mgd of wastewater capacity in the service area to provide capacity for population growth in the Puget Sound region (Figure 2-3). In addition, the volume of wastewater requiring treatment in the service area will reach the wastewater system's existing capacity in 2010, at which time the Brightwater Treatment Plant would provide 36 mgd of new capacity. Another capacity increment comes with the 20-mgd expansion of the South Treatment Plant in 2029 and a further expansion of Brightwater in 2040 to 54 mgd.

2.4.1.2 Flow Estimates Revisited for Brightwater

The population and flow estimates were recently updated for Brightwater. The findings affirmed King County's earlier analysis in the RWSP showing that flows in the Brightwater Service Area will exceed the capacity of the system by 2010. The updated average wet weather flow data suggest that the South Treatment Plant may reach its 115 mgd capacity earlier than originally projected and that some north-end basins can be diverted to West Point through 2050. Further, the preliminary estimates indicate that the design peak 20-year flow estimates in the RWSP of 170 mgd in 2050 remain valid for the Brightwater Treatment Plant. See Appendix 2-A, Population and Flow Analysis.

2.4.2 Flexibility to Meet Treatment Needs

The proposed Brightwater Regional Wastewater Treatment System would be part of the larger King County wastewater treatment system, which includes two other regional treatment plants—the West Point and South Treatment Plants—and a large system of conveyance pipelines and pump stations. Brightwater is being designed primarily to serve population growth in north King County and south Snohomish County. However, there are many different drainage basins that contribute flow to the regional King County system. A regional wastewater system is like a network of freeways with on-ramps and off-ramps. As one route becomes overloaded, flows must be redirected to another route in order to keep the system functioning effectively.

King County needs flexibility to distribute flows at different times among the two existing regional plants and the proposed Brightwater regional plant. Some of the basins within the Brightwater Service Area will always be directed to the Brightwater Treatment Plant, some will flow at times to the West Point Treatment Plant, and others will flow at

times to the South Treatment Plant. The need to redirect flows will vary depending upon the rate of population and employment growth, where it occurs within the King County Service Area, and where capacity is available in the conveyance and treatment systems. As conditions change, the service areas for each of the regional plants may be adjusted to treat flows where capacity is available. For example, if population in the Brightwater Service Area grows faster than projected and population in other service areas grows slower, flows could be redirected to the West Point or South Treatment Plants if capacity is available at those plants and in the conveyance systems leading to them.

It is important to consider the ultimate capacity at buildout when designing wastewater treatment facilities because the lifetime of the facilities can easily go beyond 50 years. King County will continue to update population and employment forecasts and flow projections and model future wastewater conveyance and treatment demand to make sure that the sizing and timing of facilities such as Brightwater are appropriate in the future. By incorporating updates to population and employment forecasts, considering new and/or expanded development, validating I/I flows, assessing the current condition and capacity of major pipes, and making changes in the system-wide flow management plan, King County will be able to meet its contractual obligations with each component agency as well as any water quality requirement and related regional public health and safety responsibility. Depending on how growth in various parts of the King County Service Area actually occurs over the planning period, some projects in the RWSP, including elements of the Brightwater System, may be built later, while others may be built sooner to provide adequate facilities and services when needed.

2.4.3 Developing Service Strategies

Since the early 1990s, King County has been planning how best to provide added wastewater capacity. The Wastewater 2020 Plus process characterized the existing system and identified more than 60 alternatives for expanding the regional system (King County Metro, 1994). Two important elements contributed to the development of a wide range of possible alternatives: guidance from citizens and stakeholders and concurrence with planning objectives. The number of alternatives was eventually narrowed to four during a series of workshops attended by King County staff, stakeholders, and an expert panel.

King County summarized these four alternatives, termed service strategies, in the *Draft Regional Wastewater Services Plan* (King County, 1997b) and issued a Draft EIS (King County, 1997a) that addressed the impacts of the alternatives. Subsequently King County conducted a regional public involvement process to explain wastewater issues, collect comments on the Draft EIS, and solicit feedback from citizens. Based on public and agency comments and other considerations, the King County Executive recommended an approach to managing this region's wastewater for the next 30 years or more. This approach was outlined in the Executive's Preferred Plan, which was accompanied by a Final EIS (King County, 1998).

2.4.4 Executive's Preferred Regional Wastewater Services Plan

After reviewing the public comments on the RWSP service strategies and considering other factors such as cost, flexibility, and regional equity, the King County Executive decided that a three-plant system based on Service Strategy 3, featuring a new regional treatment plant located in north King County or south Snohomish County, would provide the best means of meeting the region's needs now and in the future. King County released the Executive's Preferred Plan and the *Final Environmental Impact Statement for the Regional Wastewater Services Plan* (King County, 1998) in April 1998. The main features of the Executive's Preferred Plan included building a new North Treatment Plant, expanding the South Treatment Plant, and building a new outfall into Puget Sound. The plan included other important features:

- Making improvements to parts of the conveyance system, including pipes and pump stations, to serve treatment plants and to handle additional flow in the system
- Pursuing an aggressive combined sewer overflow (CSO) program, including building CSO storage tanks and treatment plants, to reduce discharges from each CSO outfall to meet the state standard of one overflow event per year on average
- Implementing a program that includes financial incentives that encourage local agencies to reduce inflow and infiltration into the King County wastewater system
- Continuing to recycle biosolids and finding ways to make biosolids recycling even more efficient
- Providing opportunities to use reclaimed water from the plants and continuing to study ways to economically provide reclaimed water
- Continuing to work with the state to allow King County more flexibility in applying the capacity charges so that growth pays for its appropriate share of improvements to the system

2.4.5 King County Council Review and Adoption

Following the release of the Executive's recommendations in April 1998, the King County Regional Water Quality Committee (RWQC)—a committee of the King County Council—began a detailed review of the plan. On December 10, 1998, the RWQC forwarded its adopted amendments in Proposed Substitute Ordinance 98-290 to the King County Council.

Council review began early in 1999 with Council staff presenting the various elements of the amended RWSP. During review, the Council appointed a panel of experts from across the United States, the RWSP Peer Review Panel, to evaluate the assumptions used to develop the RWSP. The experts responded to 11 questions. The Panel convened in the King County Courthouse in April 1999 and evaluated the King County wastewater

situation based on their experience at other locations and on industry standards. The Panel reviewed information and heard presentations by persons responsible for studying and evaluating the various elements of the plan. Overall, the Panel found that the assumptions used to develop the RWSP were reasonable, appropriate, and consistent with industry standards for wastewater collection and treatment and made suggestions on further refinements. The Panel's findings were presented in the April 1999 report entitled *King County Peer Review of the Regional Wastewater Services Plan* (King County, 1999a).

The Council continued its deliberations on the RWSP, and, on June 21, 1999, adopted a set of amendments to the proposed ordinance.

The amended ordinance was referred to the RWQC for reconsideration, as required by the King County Charter. The RWQC reviewed the amended plan and made two more rounds of recommendations to the Council. The Council adopted the RWSP by Ordinance 13680 on November 29, 1999. The Ordinance was signed by the King County Executive and became effective December 13, 1999. King County developed the RWSP Operational Master Plan (King County, 1999b) to explain how King County will implement Ordinance 13680. Whereas Ordinance 13680 focuses on the policies that drive the RWSP, the Operational Master Plan focuses on defining the performances measures, needed resources, and projected workload necessary to implement the RWSP.

2.5 Brightwater Siting Process—Phases 1 and 2: Screening and Selection

Following the adoption of the RWSP in late 1999, King County began a 4-year, three-phase process to define and develop the Brightwater proposal and to site the Brightwater Treatment Plant and its associated conveyance pipelines and marine outfall. This section describes activities carried out under the first two phases of the siting process, which gathered preliminary information and applied Council-adopted policy criteria to help develop the Brightwater proposal and identify alternatives for evaluation in the Phase 3 environmental review process. Phase 3 activities are described in the section following the discussion of Phases 1 and 2.

2.5.1 Phase 1 – Identify and Evaluate Treatment Plant and Outfall Zones

The goal of Phase 1 was to identify a group of 10 to 15 potential candidate sites for the plant. To accomplish this goal, King County began three parallel efforts. One effort was to identify land areas that might be suitable for a treatment plant; another effort was to identify possible outfall zones; the third effort was to develop a set of regional policy site

screening criteria that would be used to define the Brightwater proposal and evaluate potential treatment plant and outfall sites.[7]

2.5.1.1 Finding Potential Land Areas

The King County Brightwater team, composed of King County Department of Natural Resources and Parks staff and consultants, identified a pool of 95 potential land areas from a variety of sources, including geographic information system analysis, a commercial/industrial land search, and a community nomination process. These land areas were validated by applying a broad set of engineering and environmental constraints to identify serious problems that would limit the construction or operation of a wastewater facility; for example, steep slopes, flood zones, presence of parks, or Superfund sites. This initial screening revealed 38 unconstrained sites that could be brought forward for further review.

2.5.1.2 Finding Potential Outfall Zones

In addition to finding potential land areas, King County initiated a comprehensive study to provide basic scientific information on Puget Sound to support the siting of the outfall and its subsequent design and permitting. This study evaluated seabed geology, currents, marine life, and chemical and bacteria conditions in Puget Sound. As a result of King County's study, eight suitable outfall zones were identified for further evaluation in Phase 2.

2.5.1.3 Developing and Applying the Policy Site Screening Criteria

During this initial screening process, the Brightwater team developed policy site screening criteria to further refine the proposal and evaluate the unconstrained sites. To guide this process, the team first developed a set of project goals based on King County policy established in the RWSP. Then, based on public comments and refinements by technical, policy, and advisory committees, a set of draft policy site screening criteria was developed. In September 2000, the King County Executive forwarded the policy criteria to the King County Council for review. In February 2001, the Council amended the policy criteria and adopted a refined set of policy site screening criteria for use in Phase 1 of the siting process. The amended policy site screening criteria were adopted in Ordinance 14043. The Council also requested a second and third policy review process. The second review would be to approve the Phase 2 candidate sites and refined policy criteria (that would now be termed "policy site selection criteria") for the final candidate

[7] A detailed description of the Phase 1 siting process is in *Siting the Brightwater Treatment Facilities: Site Selection and Screening Activities*, (King County, 2001d). This document is available at all King County public libraries or online at http://dnr.metrokc.gov/wtd/brightwater/library.htm.

sites. The third review would be to approve the final candidate sites for evaluation in the State Environmental Policy Act environmental review process in Phase 3.

To help evaluate how well a site met the adopted policy site screening criteria, the team developed a set of detailed evaluation questions (DEQs) that assessed measurable site characteristics. Certain DEQs were considered "key factors" and were given additional emphasis to help distinguish between the sites. There were eight key factors in the areas of community, environment, and engineering. For example, one engineering key factor considered the amount of usable area on a particular treatment plant site, which affected treatment plant efficiency, flexibility, cost, and buffer size. After applying the DEQs and policy criteria to each of the 38 unconstrained sites, the King and Snohomish County Executives recommended seven candidate sites to the King County Council for continued evaluation in Phase 2 of the siting process (Table 2-2).

Table 2-2. Phase 1 Proposed Candidate Sites

Site Name	Site No.[a]	Total Area[a] (acres)	Estimated Useable Area (acres)	Jurisdiction	Current Land Use
Unocal	IND1/71	53	43	City of Edmonds, Snohomish Co.	Unocal operations; Inactive Tank Farm
Point Wells	30/CN5	98	29	Unincorporated Snohomish Co.	Chevron Asphalt Plant
Gun Range	33/CN1	80	80	Unincorporated Snohomish Co.	Kenmore Gun Range
Gravel Quarry	17	69	68	City of Bothell & Unincorporated Snohomish Co.	Gravel Quarry and Undeveloped Land
Thrashers Corner	19/25	144	63	City of Bothell, Snohomish Co.	Low Density Residential & Open Space
Route 9	IND9/64	108	104	Unincorporated Snohomish Co.	Businesses & Light Industrial
Woodinville	15	44	44	City of Woodinville, King County	Undeveloped – Residential Proposed

[a] Site number designations and acreage were developed as part of the lands area inventory. "IND" indicates its current use as an industrial site. "CN" indicates that the site was submitted as part of the community nominations process. Total area reflects the acres that were included in the site at the time of the inventory.

2.5.1.4 Council Review of Candidate Sites and Policy Criteria

Soon after announcing the seven candidate sites, King County learned that the State of Washington was preparing covenants for the Woodinville site that would restrict the land use on the site to affordable housing. Because state authority supersedes a county's

authority to condemn the land, the King County Council removed the Woodinville site from consideration during its meeting on May 14, 2001. Also at that meeting, the Council passed Ordinance 14107 approving six candidate sites for continued evaluation during Phase 2 of the siting process. The Council also adopted the policy site selection criteria to ensure that sites were evaluated for opportunities to recycle biosolids, methane gas, and reclaimed water. A new policy criterion was added, which stated, "King County shall select north treatment plant sites that do not displace existing facilities that are used for law enforcement and public safety training and, as a practical matter, are difficult to site elsewhere." The new policy criterion was applied to the six remaining candidate plant sites in Phase 2 of the siting process (Figure 2-4).

2.5.2 Phase 2 – Developing System Alternatives

Phase 2 of the Brightwater siting process began in June 2001 following the King County Council's selection of six candidate sites and eight marine outfall zones for further study and adoption of the policy site selection criteria. The Phase 2 process was broadened to evaluate complete "candidate systems" for each site; that is, conceptual systems that included a general plant layout, two options for construction methods (tunneling and open cut) for conveyance pipes serving the plant, and two options for construction methods (tunneling and open cut) for the marine outfall (King County, 2001a).

2.5.2.1 Applying the Policy Site Selection Criteria

As in Phase 1, the Brightwater team developed and applied the policy criteria using a set of detailed evaluation questions (DEQs). The DEQs were developed to provide comparable answers to questions that evaluated potential project constraints and opportunities in four areas: technical (engineering and land acquisition), environmental, community (neighborhood effects), and financial. For each of the six candidate systems, one or more DEQs were applied to each policy site selection criterion. Information used to answer the DEQs came from site reconnaissance, aerial photographs, local plans, published environmental and geotechnical data, known permitting requirements, title reports, and cost estimates from comparable construction projects.

Based on the professional judgment of the Brightwater team, certain DEQs were more effective than others in distinguishing substantive differences between sites, so these DEQs carried additional emphasis for determining the most suitable candidate systems. These DEQs, termed "key factors," evaluated the relative level of constraints imposed by factors such as useable site area, legal restrictions on title, Endangered Species Act compliance, wetlands, compatibility with surrounding land use, and traffic disruption. For example, in considering the preliminary plant layouts for each site, the Brightwater team determined whether the useable site area would limit flexibility in designing, constructing, or operating the treatment facility. Sites with greater useable area allowed more flexibility (fewer constraints) and were ranked higher than sites with less useable area.

2.5.2.2 Recommended Candidate Sites

The Brightwater team evaluated the six candidate sites and eight marine outfall zones using the DEQs to determine which of the sites and outfall zones best satisfied the policy site selection criteria (Table 2-3). Of the six sites evaluated, only the Gun Range failed to meet all of the mandatory policy criteria. This is because the Gun Range supports public safety and law enforcement training, and relocating the Gun Range within a reasonable time or within a reasonable distance to the existing site would not be possible. The Thrashers Corner site was found to be the least suitable site because the ongoing analysis established that extensive onsite wetlands fragment the useable area, and thus would make it infeasible to accomplish the objectives of the treatment plant proposal. The remaining four sites—Point Wells, Unocal, Gravel Quarry, and Route 9—were found to be consistent with the policy site selection criteria and feasible alternatives for future environmental review.

Table 2-3. Phase 2 Candidate Sites

Site	Meets policy site selection criteria	Level of suitability	Executive's recommendation
Unocal	Yes	Suitable	Advance to Phase 3
Route 9	Yes	Suitable	Advance to Phase 3
Point Wells	Yes	Suitable	
Gravel Quarry	Yes	Suitable	
Thrashers Corner	Yes	Unsuitable	
Gun Range	No		

2.5.2.3 Executive's Recommendations for Phase 3

After considering the four candidate systems, the King County Executive found that two systems rose above the rest: Unocal and Route 9. In addition to meeting the future wastewater needs of the service area, these two systems offered significant opportunities for intergovernmental partnerships that would benefit the surrounding communities. They also met regional policy goals and needs addressing efficient use of urban land, provision for affordable and multimodal transportation options, revitalization of land, and/or the balancing of urban land uses with environmental protection. Based on these policy considerations, the Executive recommended to the King County Council that Unocal and Route 9 advance for continued evaluation in Phase 3. For conveyance, the Executive recommended that both open cut and tunnel construction methods be evaluated and that outfall Zones 5, 6, 7S, and 7N continue forward for evaluation in Phase 3. A total of five diffuser sites within these outfall zones were moved forward in the evaluation process as well. The proposed final candidate systems recommended to the Council by the Executive are shown in Figure 2-5.

2.5.2.4 King County Council Decision

On December 10, 2001, the King County Council adopted Ordinance 14278, which identified four treatment plant sites—Edmonds Unocal, Route 9, Point Wells, and Gravel Quarry—and eight marine outfall zones as meeting the Council-adopted policy site selection criteria. The Council approved the Executive's recommendation that the Unocal and Route 9 sites and outfall Zones 5, 6, 7S and 7N be considered as action alternatives for environmental review in Phase 3.

2.6 Brightwater Siting Process—Phase 3: Environmental Review

King County began Phase 3 of the siting process in January 2002. The primary activity under this phase was to conduct a more detailed environmental review of the Unocal and Route 9 action alternatives and a No Action Alternative to identify the impacts of not constructing the Brightwater facilities. The environmental review of the Brightwater alternatives was performed under the requirements of the State Environmental Policy Act (SEPA). King County issued the Brightwater Draft Environmental Impact Statement (Draft EIS) in November 2002, and this document, the Brightwater Final Environmental Impact Statement (Final EIS) responds to comments on the Draft EIS. This section summarizes the activities undertaken by King County to develop each of these documents and discusses the continued refinement of the conveyance alternatives throughout the Phase 3 siting process.

2.6.1 Brightwater Draft EIS

The purpose of an environmental impact statement is to provide decision-makers, regulatory agencies, and the public with detailed information about a proposed project, to evaluate the probable significant adverse environmental impacts caused by the project, and to identify alternatives and reasonable mitigation measures. A Draft EIS is issued to provide an opportunity for the lead agency to consider comments on the analysis prior to issuing the Final EIS.

2.6.1.1 Draft EIS Scoping and Public Comment

In the first half of 2002, King County focused on developing the scope of the Brightwater Draft EIS. King County issued a Determination of Significance and Scoping Notice for Brightwater on May 28, 2002, as required by SEPA. A legal notice was published in *The Seattle Times* and other local newspapers on that date. The Determination of Significance and Scoping Notice were sent to approximately 60,000 addresses that were located in the vicinity of the proposed facilities. The notices requested comments on what should be

included in the Brightwater Draft EIS. King County conducted the scoping process for the Draft EIS in May and June 2002.

Four scoping meetings with public hearings were held in Lake Forest Park, Woodinville, Edmonds, and Bothell. These meetings were advertised in *The Edmonds Beacon, The Mukilteo Beacon, The Enterprise Newspapers* (Edmonds, Shoreline, Lake Forest Park, Lynnwood, Mill Creek), *Eastside Journal, Bothell/Kenmore Reporter, Seattle Times, Woodinville Weekly, Everett Herald*, and on the King County Web site. People were invited to learn more about the project and provide their comments. The meetings used an open house format where members of the public could view displays and exhibits and ask questions of staff. Opportunities were provided at each meeting to provide oral comments for the public hearing portion of the meeting. People could speak in a formal setting with the SEPA Responsible Official present or they could record their comments privately with a court reporter. In either case, comments were recorded verbatim by a court reporter. The following number of participants attended each meeting:

- **Lake Forest Park.** Approximately 80 people attended; 19 commented.
- **Woodinville.** Approximately 40 people attended; 12 commented.
- **Edmonds.** Approximately 300 people attended; 119 commented.
- **Bothell.** Approximately 70 people attended; 15 commented.

In addition to commenting verbally at the meetings, people could comment in writing or on the Brightwater Web site. More than 1,600 scoping comments were received from government agencies, private organizations, and the public. The comments from the scoping helped to focus the environmental analysis and the content of the Draft EIS.

2.6.1.2 Executive's Preferred Alternative

Following the scoping process and based on the information gathered to date, the King County Executive identified the Route 9–195th Street System as his preferred alternative because of the relative efficiencies and flexibility it would provide. For example, the Route 9 site is twice the size of the Unocal site, making it easier to engineer and build the plant, and it would provide more room for a landscaped buffer. In addition, the design of the Route 9 conveyance system and the manner in which it would connect to the existing King County system would provide more flexibility for providing reclaimed water in the future to users near the plant and along the effluent pipeline, which carries treated effluent to an outfall in Puget Sound. The Executive's intention in selecting a preferred alternative was to let his preferences be known to help focus comments and facilitate a comparison of the alternatives.

2.6.1.3 Draft EIS Alternatives Evaluated

On November 6, 2002, King County issued the Brightwater Draft EIS, which evaluated four alternatives:

- A treatment plant at the Route 9 site with conveyance pipelines in deep tunnels primarily under NE 195th Street and NE 205th Street and a marine outfall off Point Wells to outfall Zone 7S.
- A treatment plant at the Route 9 site with conveyance pipelines in deep tunnels primarily under 228th Street SE/SW and a marine outfall off Point Wells to outfall Zone 7S.
- A treatment plant at the Unocal site with an influent pipeline to carry untreated wastewater from King County's existing pipelines near SR-405 in Bothell through Kenmore and Lake Forest Park to Edmonds. A marine outfall would be located off Point Edwards in outfall Zone 6.
- A No Action Alternative under which King County would not implement the part of the Regional Wastewater Services Plan that calls for construction of a third wastewater treatment plant but would continue to implement other programs and projects identified in the RWSP.

2.6.1.4 Public Comment on the Draft EIS

The SEPA regulations require a 30-day period to receive comments on the Draft EIS. King County provided an extended 75-day comment period (November 6, 2002 to January 21, 2003). Extensions beyond that time were also granted individually upon request. King County also held four public hearings in December 2002 in Woodinville, Bothell, Edmonds, and Kenmore to maximize opportunities for the public to comment. Meeting participants learned more about how the Draft EIS analyzed the proposed Brightwater facilities and were invited to make formal comments either verbally or in writing. Approximately 50 people gave testimony at the meetings to a court reporter. In all, more than 5,000 specific comments were submitted on the Brightwater Draft EIS from approximately 550 individuals, organizations, and agencies.

The four hearings were advertised in *The Edmonds Beacon, The Mukilteo Beacon, The Enterprise Newspapers* (Edmonds, Shoreline, Lake Forest Park, Lynnwood, Mill Creek), *Eastside Journal, Bothell/Kenmore Reporter, Seattle Times, Woodinville Weekly, Everett Herald*, and on the King County Web site. Over 300 people attended the hearings, providing approximately 150 comments.

A summary of comments on the treatment plant sites, the conveyance system, and the Draft EIS is provided below. The complete comments and responses are provided in Volumes 11-15 of this Final EIS.

Route 9 Treatment Plant Site: Participants pointed out that the Route 9 location requires more miles of pipeline than the Unocal site and therefore has greater potential for impacts. Some suggested that the site is too far from a major water body. They emphasized the need to protect the Cross Valley Aquifer from possible contamination from spills and to avoid dewatering local wells. Participants wondered whether there were adequate emergency services in the area if a spill should occur and what would happen during power outages. There was concern that the valley setting of the site would "trap" potential odors and cause them to linger in the area, as they currently do from other industries. There were concerns about traffic congestion. People expressed frustration that the treatment plant, although within the Urban Growth Area, would not serve Route 9 neighbors who are on septic systems and are outside of the Urban Growth Area.

Unocal Treatment Plant Site: Participants noted that the Unocal site would require significantly more soil excavation, resulting in more traffic and more wear and tear on the roads. They asked for more information about slope stabilization, particularly with respect to earthquakes. They expressed concern about impacts, including potential spills, to a popular waterfront area that includes a dog park, walking areas, and play equipment. Others were concerned about odors being trapped in the Edmonds "Bowl." People asked for more information about traffic impacts, including construction worker parking. They pointed out that Edmonds already has a treatment plant that serves a number of local sewer districts and that Edmonds is not part of King County's wastewater service area.

Conveyance System: Some participants said they were just beginning to learn more about the conveyance system. People expressed concern about odors from conveyance facilities. There were questions about how specific sites for conveyance facilities would be selected. Representatives from water districts and their constituents were concerned about the potential impacts of tunnel construction and operation on aquifers and water supply.

Draft Environmental Impact Statement: Participants had a number of comments on the Draft EIS and SEPA process. People said there was too much information on some issues and not enough on others. Some people asked for more technical information about traffic, aquifers, air quality, and economic impacts. Commenters suggested additional geotechnical information be gathered on the Route 9 site since more existing data on the Unocal site was available. People suggested that the air quality analysis include site-specific data on air currents. Some people suggested that the Draft EIS comment period be extended. Several residents and local governments asked that a supplemental Draft EIS be prepared.

2.6.1.5 Summer 2003 Technical Seminars

Three technical seminars were held in the summer of 2003. Each seminar was based on a set of technical reports that presented additional analysis and scientific studies in areas of concern frequently noted in the comments received on the Brightwater Draft EIS. These

seminars and reports offered people a chance to hear and review the new information prior to issuance of the Final EIS.

A month-long comment period accompanied the publication of each set of technical reports. Comments were accepted on this new information before, during, and after each of the technical seminars. The technical seminars went beyond the legal requirements of the SEPA process. Comments received were reviewed and considered by the Brightwater project team during preparation of the Final EIS. A summary of the technical seminars is provided in Volume 3 of this Final EIS, and the comments are included in Volume 16 of the Final EIS.

2.6.2 Final Environmental Impact Statement

The purpose of the Final EIS is to revise the EIS in response to comments received on the Draft EIS. This has been the primary effort by King County staff and consultants throughout 2003. King County staff and consultants researched and produced more than 70 technical memoranda in order to respond to individual comments and to develop the Final EIS. The studies provide more detailed information on a range of topics; for example, potential adverse impacts to regional aquifers and measures to prevent those impacts, geotechnical constraints on tunnel construction and operations, air quality/odor impacts at the treatment plant sites, and transportation impacts at portal sites, to name just a few. All the technical memoranda relating to the environmental review process are provided as appendices or supporting documentation for the Brightwater Final EIS. The individual comments on the Draft EIS, as well as responses to the comments, are included in Volumes 11-15 of this Final EIS.

2.6.3 Refining the Conveyance and Outfall Alignments

Another important effort carried out as part of the environmental review process was the continued development, analysis, and refinement of the conveyance corridors, portal locations, and outfall alignments. The first step in this process was to develop a set of conveyance and outfall alternatives presented to the public and agencies for the Draft EIS scoping. The second step was to further develop, evaluate, and select the alternatives to be analyzed in the Draft EIS. The third step was to reassess and further refine the conveyance and outfall alternatives presented in the Final EIS. Each step is summarized below. For a detailed overview of this process, see the *Brightwater Phase 3: Preliminary Conveyance Evaluation Summary* (King County, 2002). The process used to identify and

screen the conveyance portal locations is described in the following section. See also Appendix 2-D, Peer Review of Scientific Investigations Conducted for Phases I, II, and III of the Marine Outfall Siting Study.

2.6.3.1 Developing Conveyance Alternatives for EIS Scoping

At the conclusion of the Phase 2 siting process, King County identified six candidate systems, each with a treatment plant site, conveyance concepts, and a marine outfall zone. To identify suitable conveyance corridors to introduce to the public and agencies in the scoping period, the siting team re-examined the basic conveyance concepts developed in Phase 2 for the Unocal and Route 9 treatment systems. Using a set of guiding principles, the team identified a number of potentially feasible corridors, construction methods (near-surface or tunnel), and pumping regimes that would tie into the existing influent collection system, deliver the influent to the new treatment plant site, and then convey treated effluent from the new plant to several potential outfall zones in Puget Sound. Outfall alignments were developed based on factors such as land access to the shoreline area, bathymetry of the seabed, and probable conveyance system routes.

For the Unocal System, the preliminary analysis identified four eastern conveyance segments (between North Creek and Kenmore) and 14 western conveyance segments (between Kenmore and Unocal), all of which were influent segments. For the Route 9 system, the analysis identified four influent and 22 effluent segments. The analysis confirmed that the Phase 2 outfall Zones 5, 6, 7N, and 7S (diffuser sites A and B) provided a sufficient range of options for connecting all the conveyance alternatives.

Evaluating the Alternatives

Having developed a set of preliminary conveyance alternatives, the study team then developed 22 factors for evaluating each alternative prior to scoping. Two of the factors were considered to be mandatory “threshold” or pass/fail factors – meaning the conveyance alternative would have to pass these two factors to be considered. The two threshold factors were (1) the availability of buildable land in the potential portal/pump station areas, and (2) the absence of land uses that would exclude project development, such as environmentally sensitive lands. Ten of the remaining 20 factors were classified as “priority” factors to help determine the overall ranking of alternatives. The priority factors included the number of wetland crossings, the number of stream crossings, the total number of portals, the number of portals deeper than 200 feet, total conveyance length, the number of pump stations, the dewatering volume for disposal, construction impact on roads, total surface disruption, and surface private property acquisition.

An evaluative question was posed for each factor; for example, the question for the “steep slopes” factor was “What is the extent of potential pump station and portal areas with slopes greater than 30 degrees?” To establish a systematic response that would allow comparison among alternatives, a rating scale was used; for example, High (greater than

20 percent of the total area had slopes more than 30 degrees); Medium (less than 20 percent of the total area had slopes more than 30 degrees); Low (none of the area had slopes greater than 30 degrees). The factor questions, scales, and ratings were loaded into a numerical decision model that was used to compile the overall relative performance of alternatives.

Evaluation Results

Based on the modeling results and the desire to provide a balanced set of alternatives for screening purposes, King County identified four major conveyance corridors for the Unocal system and seven conveyance corridors for the Route 9 system (Table 2-4). In terms of the outfall zones, the evaluation confirmed that Zones 6, 7N, and 7S (diffuser site B) provided a sufficient range of options for connecting all the conveyance alternatives. Zone 5 was removed from further consideration due to its proximity to offshore currents, the added length of conveyance required to reach Zone 5, the lack of an adequate construction staging area, and the potential for community impacts. Diffuser site A in Zone 7S was removed from further consideration due to the relative steepness of the slope at the potential diffuser site, the inability to prevent the effluent plume from reaching the water surface, and the lack of an adequate construction staging area. Zones 6, 7N, and 7S (diffuser site B) were presented in the scoping notice with the 11 conveyance corridors.

2.6.3.2 Developing Conveyance Alternatives for the Draft EIS

Having completed the first step—developing conveyance alternatives for public scoping—King County continued to further refine the alternatives for analysis in the Draft EIS.

Evaluating the Alternatives

In the second round of analysis, the number of evaluation factors was expanded from the 22 factors used in the scoping round to 41 factors. The additional 19 factors covered new topics or examined topics at a greater level of detail than in the scoping analysis.

As with the preliminary screening process for scoping, a question was posed for each factor, resulting in a high, medium, or low rating for that factor. This information was again loaded into the numerical decision model to compile the overall relative performance of alternatives. The model was also used to establish balance in the relative contribution of engineering, environmental, community, land acquisition, and financial factors. King County used the model results, along with public and agency input received during scoping, to determine which of the options should be forwarded for analysis in the Draft EIS.

Table 2-4. Conveyance Corridors for EIS Scoping

Corridor	Route	Method	Total Length (miles)	Deep Tunnel Length (miles)	Micro-tunnel Length (miles)	Open Cut Length (miles)	Total Land Acquisition (acres)
Route 9 System							
E	Route 9–228th Effluent	Near–Surface	13.1	12.6	1.1	11.3	23
F	Route 9–228th Effluent	Tunnel	12.6	12.6	0	0	34
G	Route 9–County Line Effluent	Near–Surface	13.8	5.8	0.7	8.8	45
H	Route 9–County Line Effluent	Tunnel	13.1	13.1	0	0	62
I	Route 9–Edmonds South Effluent	Tunnel	14.5	14.5	0	0	46
J	Route 9–195th Effluent	Tunnel	13.4	13.4	0	0	45
K	Route 9–Influent Direct (COMMON TO ALL SYSTEMS)	Tunnel	7.8	5.6	2.2	0.0	8.5
Unocal System							
A	Unocal–South Influent:	Near–Surface	14.4	4.8	2.6	7	12
B	Unocal–South Influent:	Tunnel	12.1	12.1	0.0	0.0	25-32
C	Unocal–North Influent:	Tunnel	12.3	10.8	1.5	0.0	45
D	Unocal–195th Street Influent:	Tunnel	13.6	12.1	1.5	0.0	51

Evaluation Results

One notable result of the screening process was that only tunnel conveyance corridors were selected for analysis in the Draft EIS. This is because tunnel construction generally avoids or reduces the environmental impacts to surrounding neighborhoods and the traffic disruption associated with near-surface construction. Based on prior analysis, King County concluded that the neighborhood and traffic impacts that would result from near-surface construction were unacceptable. Accordingly, one tunnel corridor was selected for Unocal and three tunnel corridors were selected for Route 9, including one influent corridor and two effluent corridors (see Table 2-4). Within each identified corridor, there were a number of vertical and horizontal alternative-specific alignments for siting of a tunnel.

Route 9: Three corridors were selected for the proposed Route 9 system: the cross-country influent Corridor K, the effluent Corridor F along 228th Street, and the effluent Corridor J along 195th Street.

For the Route 9 influent conveyance system extending from the Kenmore Pump Station to the proposed Route 9 treatment plant site, only Corridor K was advanced from preliminary screening and was not re-examined in the Draft EIS round of screening. The deep tunnel influent conveyance along Corridor K followed a "cross-country" route (i.e., not in public right-of-way) northeasterly from the existing Kenmore Pump Station to the North Creek Pump Station and then to the proposed Route 9 treatment plant site.

For the Route 9 effluent conveyance system from the treatment plant site to the outfall zones in Puget Sound, tunnels along Corridor J (NE 195th Street) (Figure 2-6) and Corridor F (228th Street SE/SW) (Figure 2-7) and were clearly favored by the analysis. Both corridors were recommended for further review in the Draft EIS.

Effluent from the proposed Route 9 treatment plant would be discharged to outfall Zone 7S (diffuser site B) because it offered more flexibility for outfall construction methods and had greater potential to avoid or minimize impacts on the sensitive nearshore habitat as compared to Zones 6 or 7N. Additionally, the Route 9 effluent Corridors F and J could discharge to an outfall located in Zone 7S (diffuser site B).

Unocal: Influent Corridor B was selected along with two construction sub-options for evaluation in the Draft EIS: a deep tunnel conveying flow by gravity and a shallower tunnel with flow pumped through force mains. The proposed conveyance alignment would follow a route from the Kenmore Pump Station westward along SR-522 (NE Bothell Way), then northeast along SR-104 (Ballinger Way NE, Edmonds Way) to the proposed Unocal treatment plant site (Figure 2-8). Effluent from a treatment plant at the Unocal site would be discharged to an outfall located in Zone 6. Zone 6 is preferred to Zone 7N because it has fewer eelgrass beds and less overall outfall length, which corresponds to fewer impacts to the bottom of Puget Sound. The staging area for any outfall construction would be at the treatment plant site. Zone 6 is preferred to Zone 7S (diffuser site B) for the Unocal System due to added costs and impacts that would result

from conveying effluent to Zone 7S from a treatment plant at the Unocal site that could be avoided by discharging into Zone 6.

2.6.3.3 Refining Conveyance Alternatives for the Final EIS

After the Draft EIS was issued, further analyses were conducted and decisions were made to refine the conveyance alternatives in an effort to further mitigate the proposal. Decisions were made on the conveyance alternatives in two main areas. First of all, so-called "cross country" segments, which cross many privately owned parcels of land, were minimized in favor of segments in the public right-of-way (typically roadways). Accordingly, the Route 9 conveyance corridor was refined to maximize use of the public rights-of-way in order to reduce the potential impacts to private property. The second main decision was to identify depths where the tunnel could be placed in geologic layers that are the least permeable in order to provide the greatest protection of surrounding aquifers and at depths that would allow gravity flow of the effluent, thus eliminating the need for pump stations.

Many of these refinements resulted from an evaluation of the conveyance routes for the Executive's Preferred Alternative (the Route 9–195th Street System). The evaluation was implemented through a series of workshops and team meetings held in early 2003. The participants included representatives from King County, the Brightwater treatment plant predesign team, the geotechnical investigation team, and the Brightwater conveyance predesign team. National experts in all aspects of conveyance design and construction, tunneling, and outfall construction also were present. The most important findings of this process were:

- The effluent tunnel could be constructed at depths that would allow the effluent pump station at the Route 9 treatment plant site to be eliminated.
- Portal spacing could be increased from approximately 10,000 feet to 20,000 feet. The portals that are not likely to be needed would be considered "secondary." Details on the portal siting process are provided in the following section.

2.6.4 Identifying and Screening Portals

Concurrent with the process to develop and refine the conveyance alternatives in Phase 3, King County conducted a process to identify, develop, and refine the portal siting areas and then to screen the sites within each portal siting area to identify the optimum location for constructing the portal. This section provides a brief background discussion of portals and portal siting areas, summarizes how portal siting areas were identified, and then describes how the sites within the portal siting areas were screened to identify candidate sites for portal construction. For a detailed discussion of the portal screening process, see Appendix 2-B, Portal Screening Level 1 and 2 Documentation.

2.6.4.1 Background

Portal siting areas are 2,000-foot-diameter areas of land (approximately 72 acres) located at intervals along each conveyance corridor. Within each portal siting area, a minimum of 1 to 2 acres would be needed to construct the portals, which are essentially deep shafts excavated in the ground that provide access for launching and retrieving tunnel boring machines (TBMs), equipment access, staging, and operation during construction.

After initial designation of potential portal locations, as set forth in the Draft EIS, this Final EIS designates the portal siting areas as either primary or secondary. Primary portals include both launching and recovery portals. "Launching" portals are those where most of the work would occur, including tunnel excavation, lining, and ventilation operations. Once the tunnel segment is completed, the TBM would be removed (recovered or received) from the tunnel through a "recovery" portal. The recovery portal also would provide ventilation and egress and access during the final lining, cleanup, and testing stage of the project. Secondary portals are not likely to be needed but may be required for temporary ventilation, ground improvement, and/or grouting supply. If required, a secondary portal would be located within approximately 10,000 feet of another primary or secondary portal. The need for secondary portals will be determined during final design.

2.6.4.2 Identifying Portal Siting Areas

Prior to issuing the Draft EIS, King County identified 45 portal siting areas along the 11 conveyance corridors developed as part of the Draft EIS scoping process. King County considered several criteria in locating the portal siting areas; for example, the 72-acre areas were sited to take advantage of existing connections in the system, such as the Kenmore Pump Station; to meet engineering requirements, such as drive length for tunneling; and to maximize, if possible, the availability of suitable land for portal construction (e.g., undeveloped or underdeveloped land). The number of conveyance corridors selected for evaluation in the Draft EIS was then narrowed from 11 to 4, leaving 22 possible portal siting areas associated with these corridors. King County then identified multiple candidate parcels within each of the 72-acre portal siting areas for possible use as construction sites for the portals. These candidate sites, selected to minimize disturbance to the community and environment within the portal siting areas, were then evaluated in much greater detail in a three-part screening process to determine their suitability.

2.6.4.3 Screening the Portal Siting Areas

The process to identify and evaluate candidate sites for portal construction is being carried out in three phases, or levels. The Level 1 screening identified sensitive areas in each 72-acre portal siting area to avoid or minimize impacts to sensitive areas. The Level 2 screening evaluated the remaining candidate sites using criteria to determine the relative suitability of the candidate sites and rank the sites. The Level 3 portal screening,

which is also criteria based, will be used to recommend a preferred candidate site within each portal siting area. Level 3 screening has been performed on one portal site (Portal 19) because this site needed to be identified to allow marine outfall predesign work to continue. Level 3 screening of other portal sites will continue during predesign. Each level of screening is summarized as follows.

Level 1 Screening – Sensitive Area Identification

The Level 1 portal screening was performed for the 22 portal siting areas identified in the Draft EIS. In the Level 1 portal screening, sensitive areas were identified so that they could be avoided if possible. These sensitive areas included wetlands and streams; critical habitat, including high quality upland vegetation; cemeteries; and known cultural and historical resources. Geographic information system databases were used to identify sensitive areas within each portal siting area. The goal at this stage of the screening process was to avoid or minimize impacts to sensitive areas consistent with environmental regulations. The Level 1 portal screening process is described in detail in Appendix 2-B.

Level 2 Screening – Candidate Site Evaluation

In the Level 2 portal screening, multiple candidate sites within each portal siting area were identified from the areas remaining after the Level 1 screening. These sites were identified based on site visits and known or available information. The priority for candidate site selection was to look for sites that were publicly owned or that were undeveloped or underutilized private property. If there were no undeveloped or under-utilized lands, then developed property was evaluated. Among the developed properties, publicly owned sites, commercial/industrial, and residential sites were considered. The Level 2 portal screening process is described in detail in Appendix 2-B.

Level 3 Screening – Final Recommended Portal Sites

Level 3 portal screening will involve the review of additional engineering, environmental, community, finance, land acquisition, and other data, as well as input from jurisdictions to determine a recommended portal site for each portal siting area for the selected conveyance system. The Level 3 portal screening is ongoing and will be completed soon after the Final EIS is issued. As noted above, Portal 19 has already been taken through the screening process because identifying a recommended site for Portal 19 was critical to the evaluation and design of the marine outfall at Point Wells. Based on data gathered through field visits and additional geotechnical study, new criteria were applied to this portal siting area and more modeling was performed. The recommended site for Portal 19 is Site C, the Chevron Richmond Beach Asphalt Terminal at Point Wells. The Level 3 portal screening process for Portal 19 is described in detail in Appendix 2-C, Portal 19 Screening Level 3 Documentation.

Since the Level 2 portal screening, King County has refined the project design and found that fewer portals are needed for driving the tunnel than previously thought. Those needed for tunnel construction are termed "primary portals." Many of the remaining portals are termed "secondary portals" and potentially will be used for such functions as ventilation, ground improvement, and supplying grout to support tunnel construction. Secondary portals would be used much less intensely than primary portals; the magnitude and duration of impacts and the amount of land required (up to 0.5 acre) would be less. Specific secondary portal sites have not been selected because it will not be known until final design whether any of them will be needed. The Level 3 screening process would be completed for any secondary portals that are required.

2.6.5 Executive's Final Decision

The King County Executive will make a final decision on which Brightwater alternative to construct based on many considerations, including, but not limited to the findings of the Draft and Final EIS; comments from the public, government agencies, tribal governments, and elected officials; and other factors such as cost and regional policies. The decision is expected in late 2003.

2.7 Public, Agency, and Tribal Involvement

Throughout the Brightwater siting process, King County has continued to place a high priority on involving stakeholders (including local, state, and federal agencies, and tribes) and members of the public. Beginning early in 2000, King County developed a public involvement program to inform and involve interested people in an open, far-reaching, and inclusive way.

2.7.1 Examples of Public Involvement Activities

King County has sponsored a range of activities that are continually updated throughout the siting process. Examples of these activities include:

- Numerous briefings to elected officials and other regional community, business, and environmental leaders
- A process to solicit community nominations for treatment plant sites and have residents help develop the policy criteria by which sites would be evaluated
- A Web site that describes the project and provides opportunities to comment

- Focus groups (2000 and 2001), workshops for regional stakeholders (August 2000, May 2001), and two community task forces based around the potential plant sites (2002)
- Public meetings throughout the siting area (June 2000 and April 2001), scoping meetings for the Draft EIS (June 2002), and hearings for the Draft EIS (December 2002)
- A speakers' bureau, toll-free telephone line, and timely response to citizen correspondence
- Design workshops for communities near potential plant sites (Summer 2002) and conveyance workshops for communities near potential conveyance routes (Summer 2002)
- Technical Seminars in which King County made available technical studies completed after publication of the Draft EIS. Tribes, local jurisdictions, state and federal agencies, and the public were provided an opportunity to review and comment on the studies (Summer 2003)
- Regulator Workshops (2000-2003) during which King County provided information and discussed the proposal with regulators from local jurisdictions and state and federal agencies
- Meetings with individual jurisdictions and agencies to discuss permitting requirements and issues (2002-2003), including the Cities of Bothell, Brier, Kenmore, Lake Forest Park, Edmonds, Woodinville, and Shoreline; the Town of Woodway; Snohomish County; the U.S. Army Corps of Engineers; the Washington State Department of Ecology; and the Washington State Department of Natural Resources
- Meetings with the Suquamish and Tulalip Tribes to provide information about the Brightwater proposal and discuss issues of concern (2002-2003)

Many of these activities are ongoing and provide people with multiple opportunities to get involved in the project in the manner that best meets their individual needs. In addition, King County provides numerous opportunities to comment on the Brightwater project. For example, residents were asked for input on treatment plant sites and conveyance routes before specific ones were selected for evaluation in the Draft EIS, and they were asked to comment on the scope of the Draft EIS, on the Draft EIS itself, and on the technical memoranda being prepared for the Final EIS. The detailed public involvement activities for Phases 1 and 2 of the Brightwater siting process are described in *Public Involvement Summary for Phase 1 of Siting Process* (King County, 2001b) and *Public Involvement Summary for Phase 2* (King County, 2001c).

2.7.2 Phase 3 Public Involvement Activities

In Phase 3, the environmental analysis and the requirements of the State Environmental Policy Act (SEPA) were key issues for the public involvement process. As part of the

SEPA process, members of the public were invited to participate in developing the scope of the EIS. They were also invited to comment on the Draft EIS. However, the public involvement process for Phase 3 went beyond the requirements of SEPA. For example, through workshops, briefings, a Web site, and technical seminars, King County attempted to raise awareness of the project in general and awareness of the specific project elements in particular (e.g., the treatment plant, conveyance pipelines, and outfall). Residents have also asked about specific ways that Brightwater could be a good neighbor and what mitigation could make Brightwater an asset to the community. Community members were asked to help develop design guidelines for the treatment plant and invited to review and comment on technical information developed in response to comments on the Draft EIS.

As in Phases 1 and 2, King County offered a wide range of techniques to engage the public so that people could choose the most convenient method. Some techniques were far-reaching while others offered smaller groups of interested people the opportunity for in-depth discussion of specific issues. All activities were designed to facilitate active discussion and two-way communication.

2.7.2.1 In-Depth Discussion Activities

A number of groups formed to discuss the project in detail during Phase 3. A workgroup of educators discussed how Brightwater mitigation could support education in the community—for example, by providing field trip and other educational opportunities on a number of related themes. An education task force was formed from this group to further develop these ideas. Two task forces of community members near each proposed treatment plant site provided suggestions for informing and involving their specific community in Brightwater planning issues. The Executive Advisory Committee, or EAC (formerly called the Siting Advisory Committee), made up of high-level officials representing tribal governments, local jurisdictions, businesses, and environmental groups, continued its work advising the Snohomish and King County Executives. The EAC concluded its work in February 2003.

The Brightwater team held four Design Workshops, two near each proposed treatment plant site. Community members developed design guidelines for the architects and designers to use in developing plans for the facilities.

Seminars allowed people to talk directly with technical experts. In October 2002, the Brightwater team hosted a technology seminar in response to suggestions from the Route 9 Task Force. The event was so effective for sharing technical information that King County decided to use that format to respond to requests for additional information during the Draft EIS comment period. A series of three technical seminars were held in 2003 to provide detailed information on the proposed project and its impacts and to respond to questions that arose during the Draft EIS comment period. Technical memoranda were issued in conjunction with the seminars. People were invited to comment on the technical information prior to the issuance of the Final EIS. These

meetings were open to the general public and provided in-depth technical information. One technical seminar was videotaped and aired on King County's Cable Access TV Station, CTV.

The Brightwater team took advantage of another construction project in 2003 to provide detailed information about construction of the conveyance pipelines. Representatives of local jurisdictions and the media were invited to tour the Henderson/Martin Luther King Combined Sewer Overflow project, which has portals and pipeline tunnels similar to the Brightwater conveyance system. By including the media in the tours, the team was able to extend the in-depth tours to the far-reaching general audience. In addition, King County offered workshops and individual meetings at key project milestones to answer questions regarding the proposed Brightwater System and provide detailed information to tribal governments and federal, state, and local agencies.

2.7.2.2 Efforts to Involve the Public in Brightwater

A number of "far-reaching" techniques were designed to reach a broad audience and allow people to decide how to be involved depending on their level of interest. For example, King County provided information to the media at key milestones, and hundreds of newspaper articles were written about Brightwater. King County placed newsletters and other project information in places convenient to the public and provided a speaker's bureau to address issues of interest to various groups. King County also installed a toll-free line that allowed people to call and ask questions of Brightwater staff.

The Brightwater Web site has been an effective way of providing information on the project and has averaged over 1,600 visits per month to the site. People have been able to obtain information about the siting process, proposed facilities, and public involvement activities, and view or download newsletters and documents. The Web site was especially active during the comment period for the Draft EIS, when the chapters, figures, and appendices were viewed or downloaded over 4,500 times. The Web site is updated regularly to provide current, accurate information on a complex project.

The project newsletter was regularly mailed to the project mailing list and included a mail-back comment card. This was supplemented by large mailings of the SEPA scoping document and a public information summary of the Draft EIS. These last two documents and a flyer advertising the technical seminars were mailed to a list of approximately 60,000 addresses using existing carrier routes to reach every address within a minimum of 500 feet of any proposed facilities. In most cases these existing carrier routes went well beyond the 500-foot minimum.

2.8 Siting Essential Public Facilities as Required by the Washington State Growth Management Act

Under the Washington State Growth Management Act (GMA), facilities such as Brightwater are termed an "essential public facility." The GMA requires local governments to establish a process for identifying and siting essential public facilities (RCW 36.70A.200). Essential public facilities (EPFs) include those facilities that are typically difficult to site, such as airports, regional transportation facilities, correctional facilities, and wastewater treatment plants. The legislature, the Growth Management Hearings Board, and the courts[8] have found that EPFs have not been sited in optimal locations in the past; rather they have been sited in those areas where there is the least amount of local opposition. The EPF section of GMA was adopted to put an end to this practice and lead to EPFs being sited in optimal locations, while allowing EPFs to be subject to reasonable mitigation. To ensure that local jurisdictions will be able to site and develop the EPFs needed in the region, the GMA provides that no local comprehensive plan or development regulation may preclude the siting of EPFs [RCW 36.70A.200(5)]. However, while local jurisdictions cannot preclude EPFs, they can require reasonable mitigation of their construction and operation.

The following sections summarize the process adopted by Snohomish County and the City of Edmonds for siting EPFs and outline how Brightwater meets those criteria. A more detailed discussion is provided in Chapter 11.

2.8.1 Essential Public Facilities Siting Process in Snohomish County and the City of Edmonds

Both Snohomish County and the City of Edmonds adopted into their respective comprehensive plans the EPF common siting process developed by Snohomish County Tomorrow. This EPF siting process directs Snohomish County and its cities to develop wastewater treatment facilities to support urban growth within Urban Growth Areas in a manner consistent with the protection of the natural environment.[9] The process considers 11 factors in the siting of an EPF:[10]

[8] See RCW 36.70A.200; *City of Des Moines v. Puget Sound Regional Council*, 97 Wn. App. 920, 988 P.2d 993 (1999); *City of Des Moines v. Puget Sound Regional Council*, 98 Wn. App. 23, 988 P.2d 27 (1999).

[9] Snohomish County GMA Comprehensive Plan, Goal UT-3 and Appendix B (Snohomish County, 1995 and updates).

[10] Snohomish County is considering a more detailed EPF ordinance which outlines the procedures to apply these criteria to a given EPF proposal.

- The project sponsor must demonstrate a need for the EPF.
- The facility must be consistent with the sponsor's long-range plans for facilities and operations.
- The EPF should demonstrate its relationship to local, regional, and state plans, and should be consistent with the adopted plans of the host community.
- The facility should include a significant share of the host community's population.
- Sponsors must submit documentation on the minimum siting requirements for the EPF, such as facility size, and mitigation needs.
- The project sponsor should investigate alternative sites.
- The overall concentration of essential public facilities in Snohomish County must be reviewed to avoid an undue concentration in any one community.
- Sponsors should encourage local public participation.
- The project must be consistent with local land use regulations.
- The project should be compatible with surrounding land uses.
- Adequate mitigation must be provided.

The 2001 Snohomish County Capital Facilities Plan also makes specific note of King County's need to build a third regional treatment plant based, in part, on the contribution to the system of Snohomish County wastewater flows:

> King County has identified a need for a third regional treatment facility at the north end of its service area and is now in the process of selecting a site. Part of the demand for this additional treatment capacity is originating in south Snohomish County where wastewater flows from the Alderwood and Cross Valley Service Areas southward into the King County system … Existing state and local regulations will ensure that planning, design, and construction of necessary treatment capacity is completed before new development is allowed to connect to wastewater systems that are at or over treatment plant capacity.[11]

2.8.2 Consistency with Comprehensive Plan EPF Criteria for Snohomish County and the City of Edmonds

King County believes that the proposed Brightwater Regional Wastewater Treatment System would carry out the mandate found in various state laws to provide adequate

[11] Snohomish County GMA Comprehensive Plan (Snohomish County, 1995 and updates), pg. 46.

wastewater treatment facilities for regional, county, and local residents, and would support growth in Urban Growth Areas by providing necessary wastewater treatment capacity. In addition, a regional wastewater treatment plant in south Snohomish County was specifically planned for in the Snohomish County Comprehensive Plan (Snohomish County, 1995). The Brightwater proposal generally meets the EPF criteria for the host communities—Snohomish County and the City of Edmonds. Nevertheless, King County's review of the Snohomish County ordinances governing essential public facilities and the City of Edmonds zoning code indicated that portions of some local ordinances and zoning provisions could be used to preclude the siting of an essential public facility such as Brightwater at the Route 9 or Unocal site. (See Documents Incorporated by Reference in the Fact Sheet at the beginning of this EIS.)

In response to this concern, King County filed two separate petitions to the Central Puget Sound Growth Management Hearings Board (GMA Board). The petitions were filed to determine if local regulations adopted by the City of Edmonds and Snohomish County that would be applied to a permit application to site the Brightwater Treatment Plant at either the Route 9 or the Unocal site comply with the EPF provisions of the GMA.

The GMA Board has ruled on both petitions. The GMA Board ruled that the case involving Edmond's development regulations does not need to be brought at this time. The GMA Board also ruled that Snohomish County's EPF ordinance did not comply with the GMA. The GMA Board gave Snohomish County until January 14, 2004, to take appropriate legislative action to bring the EPF provisions of its development regulations into compliance with the goals and requirements of the GMA. In late October 2003, in response to the GMA Board's ruling, Snohomish County adopted a moratorium that states Snohomish County will not accept development applications for the siting of any Brightwater facilities while the moratorium is in effect.

Until the Snohomish County Council takes action consistent with the GMA Board's order, it is not possible to ascertain the final form of Snohomish County's EPF regulations. If the Route 9 site is selected for the Brightwater Treatment Plant, King County would address Snohomish County's EPF development regulations when King County is ready to submit permits for the project.

The need for the Brightwater Treatment System and its consistency with King County's long-range plans for wastewater facilities and operations was established in the Regional Wastewater Services Plan, and an updated population and flow analysis confirmed the need for the treatment plant to be operational by 2010. (The updated Population and Flow Analysis was completed after the Brightwater Draft EIS was published; see Appendix 2-A.) The minimum siting requirements for Brightwater, such as facility size, are documented in both the RWSP and this Brightwater EIS. In addition, this EIS provides extensive analysis of surrounding land uses and identifies mitigation measures—proposed mitigation measures that would be implemented and potential mitigation measures that could be implemented. These mitigation measures would minimize adverse impacts and enhance compatibility with surrounding land uses. Mitigation includes project design features such as state-of-the-art odor prevention; habitat creation,

restoration, and enhancement; and low-impact development measures to reduce stormwater runoff from the site.

The population that will be served by the Brightwater System includes residents and businesses in Snohomish County. Several sewer agencies in Snohomish County have contracts with King County that require King County to provide them with wastewater services. These sewer agencies—Alderwood, Brier, Cross Valley, Edmonds, Lynnwood, Mountlake Terrace, Olympic View, and Silver Lake—serve Bothell, Brier, Edmonds, Everett, Lynnwood, Mill Creek, Mountlake Terrace, and Mukilteo. In addition, King County has an interlocal agreement with the City of Edmonds to transfer wastewater flows between the King County and Edmonds systems (see Figure 2-1). Through this and other interlocal agreements among the agencies or between agencies and King County, the Snohomish County cities listed above would be served all or in part by the Brightwater System.

Essential public facilities take many forms, as reflected in the state legislation found at RCW 36.70A.200. These include jails, schools, transportation facilities, treatment plants, and airports. While the City of Edmonds, for example, does have two existing wastewater treatment facilities serving local needs, King County has two existing regional treatment facilities located in King County that have treated Snohomish County wastewater for many years. Neither community proposed for a new wastewater treatment system has an undue concentration of regional essential public facilities.

King County has engaged in an extensive siting process over a period of several years. This process considered many alternative sites and included extensive public participation, as described earlier in this chapter. The consideration of alternative sites and public review of the proposal continues with publication of the Brightwater Final EIS.

Please see Chapter 11 for a more detailed analysis of how the Brightwater proposal meets the essential public facilities criteria for Snohomish County and the City of Edmonds.

2.9 References

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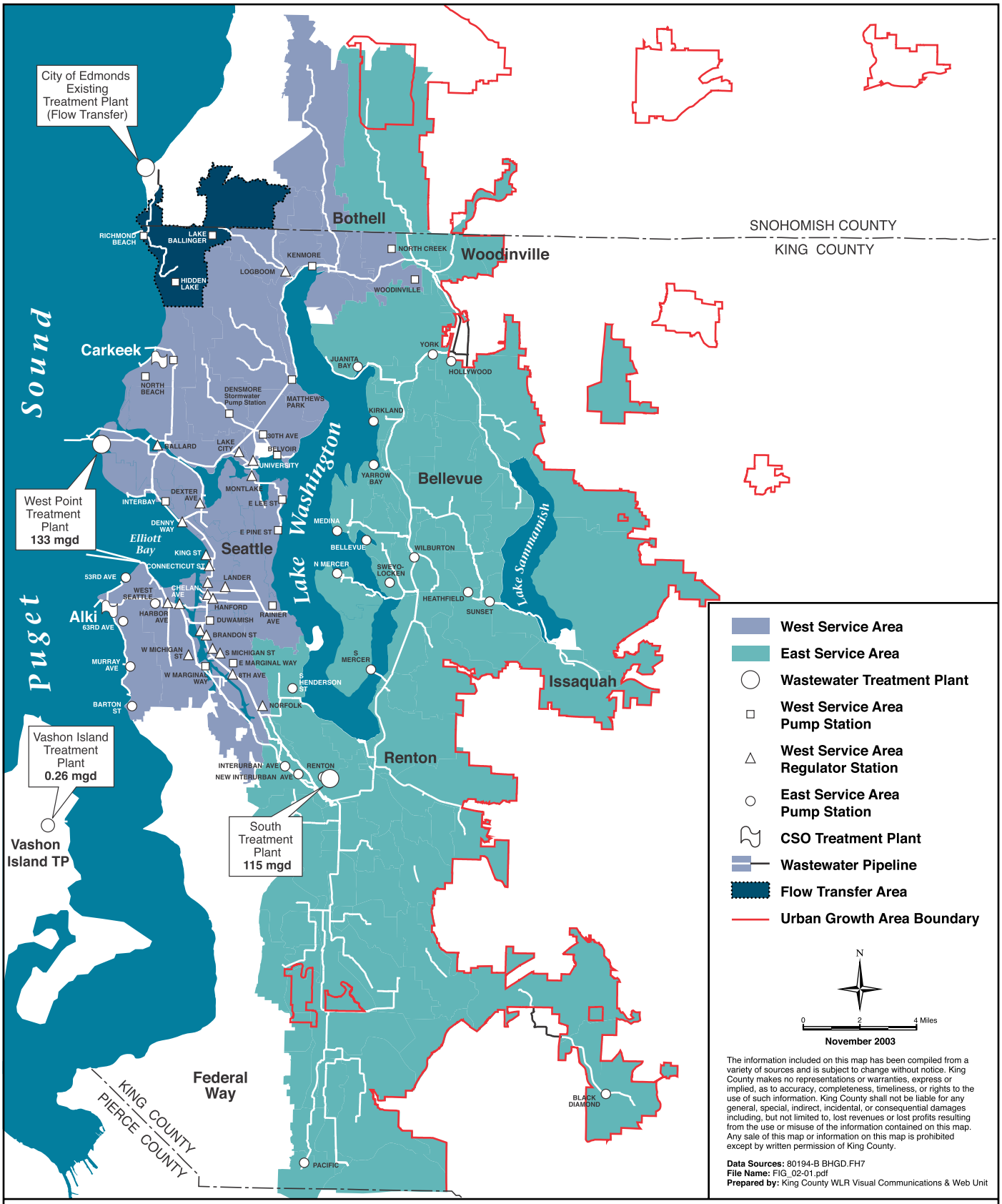
LIST OF FIGURES



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Data Sources: 80194-B BHGD.FH7
File Name: FIG_02-01.pdf
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Figure 2-1

Existing Wastewater System

BRIGHTWATER FINAL EIS

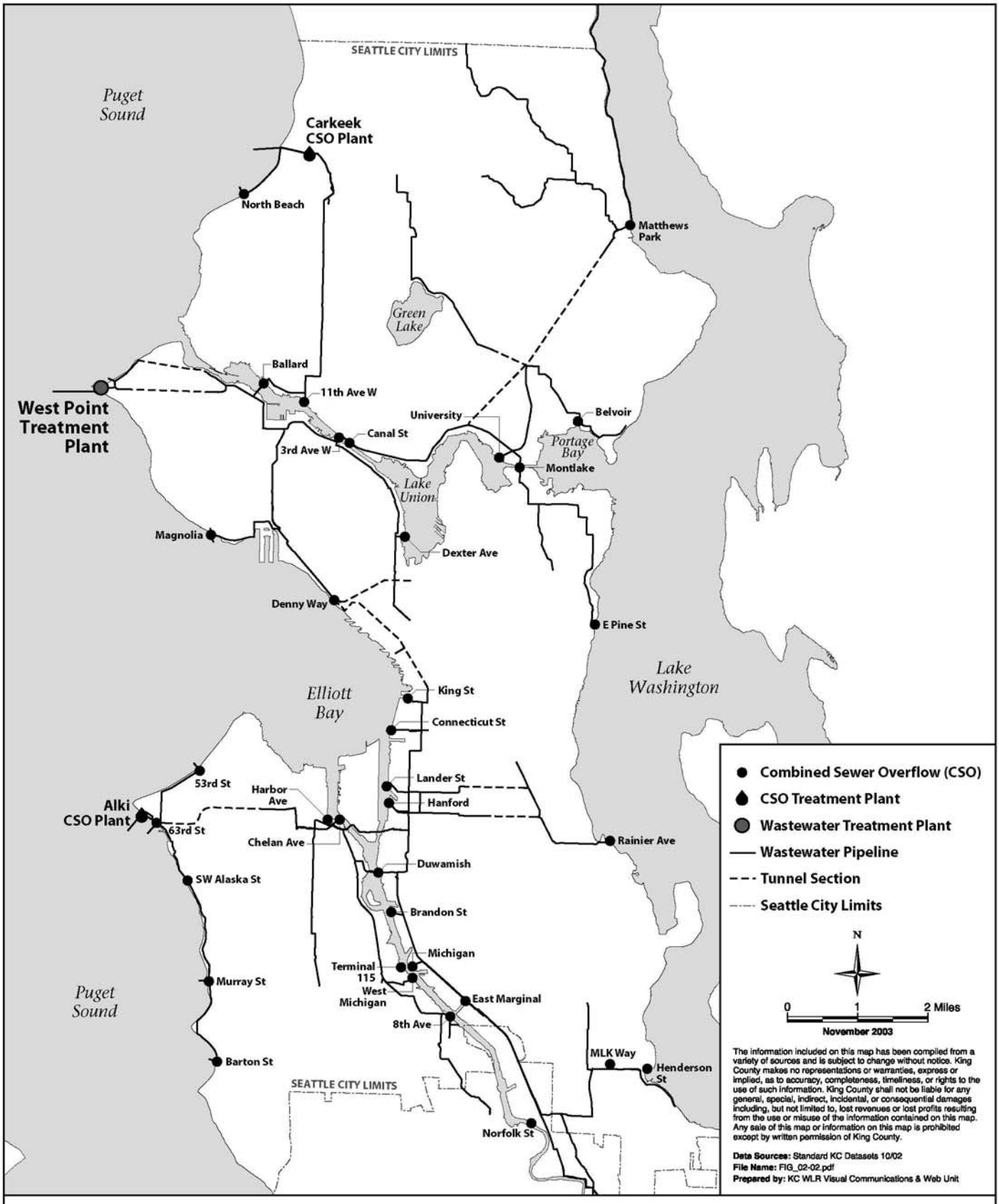

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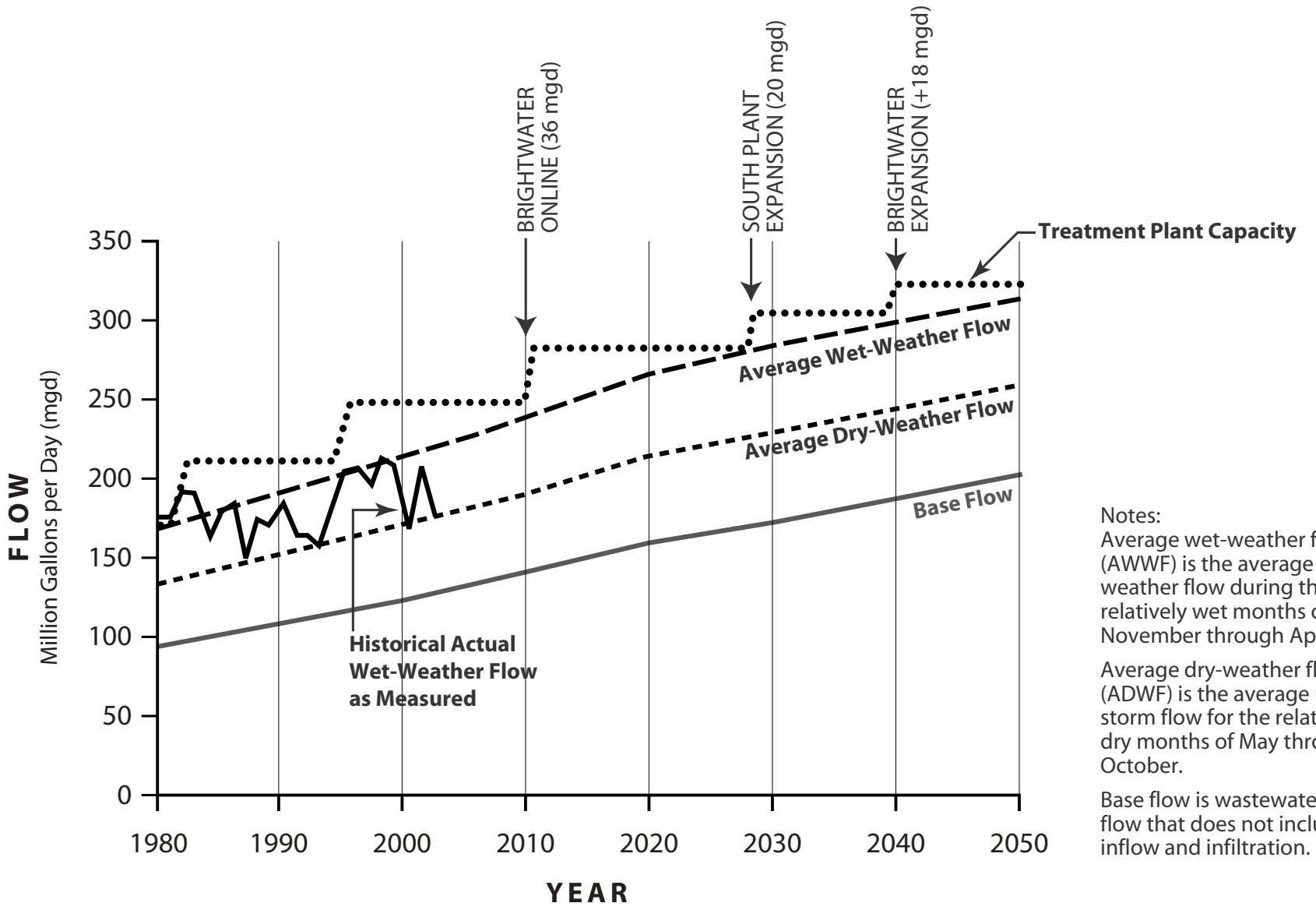
Figure 2-2

Combined Sewer Overflow Locations

BRIGHTWATER FINAL EIS



Notes:
Average wet-weather flow (AWWF) is the average wet-weather flow during the relatively wet months of November through April.

Average dry-weather flow (ADWF) is the average non-storm flow for the relatively dry months of May through October.

Base flow is wastewater flow that does not include inflow and infiltration.

Figure 2-3

Estimated Needs for Treatment Plant Capacity

BRIGHTWATER FINAL EIS

File Name: FIG_02-03.pdf
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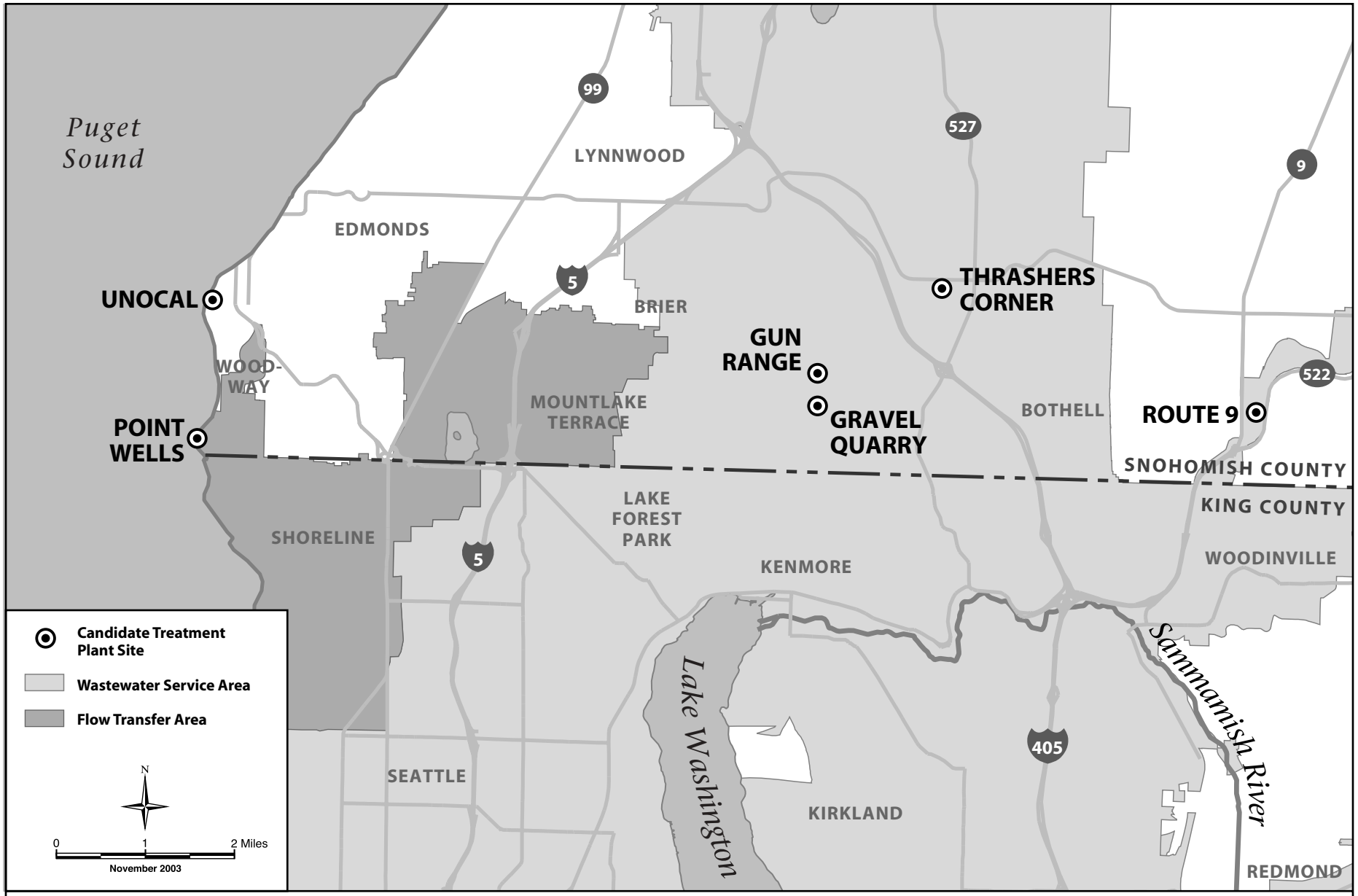

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Data Sources: King County datasets.

File Name: FIG_02-04.pdf **Prepared by:** King County WLR Visual Communications & Web Unit

Figure 2-4

Candidate Treatment Plant Sites Selected at the End of Phase 1-Site Screening, May 2001

BRIGHTWATER FINAL EIS

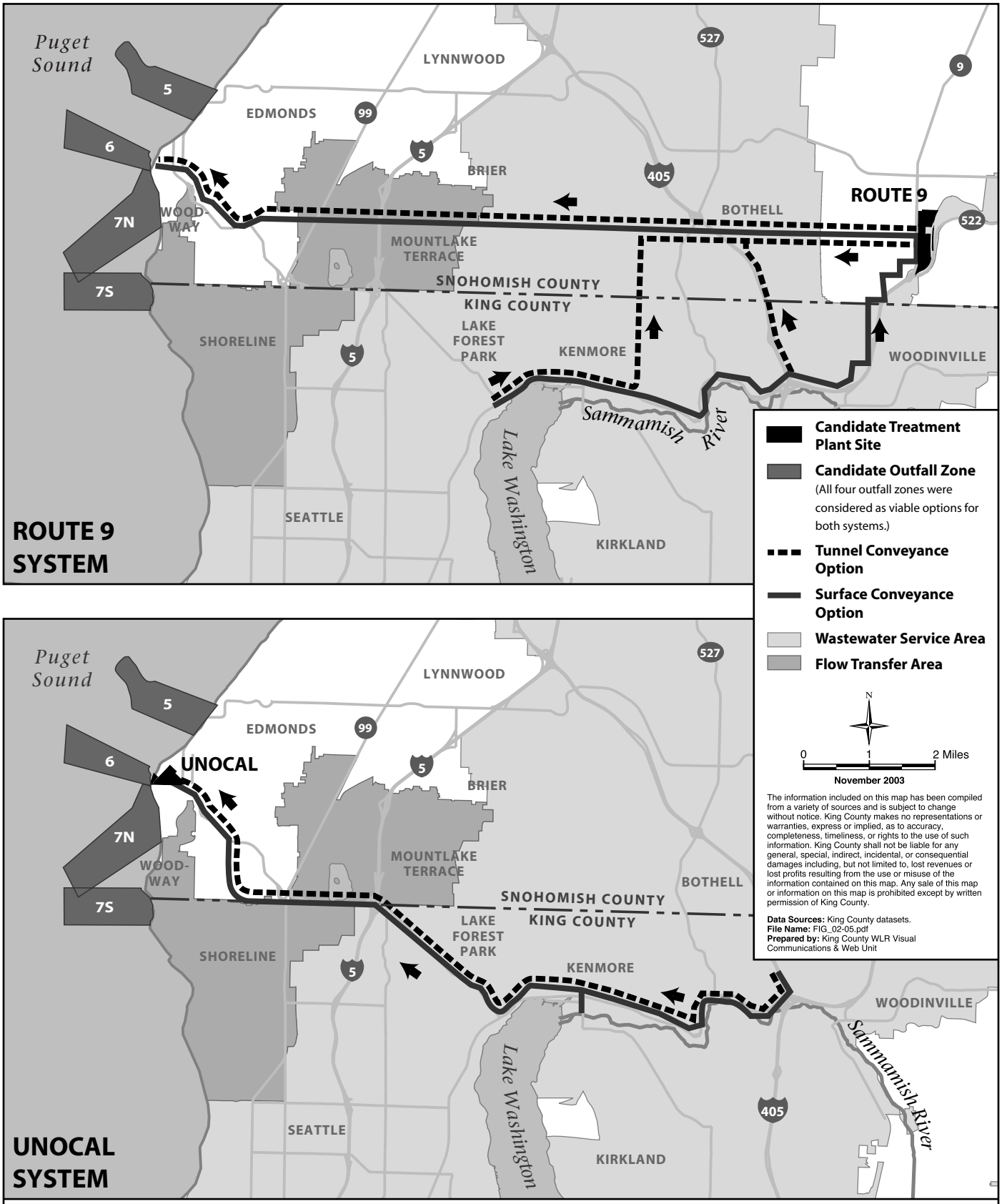

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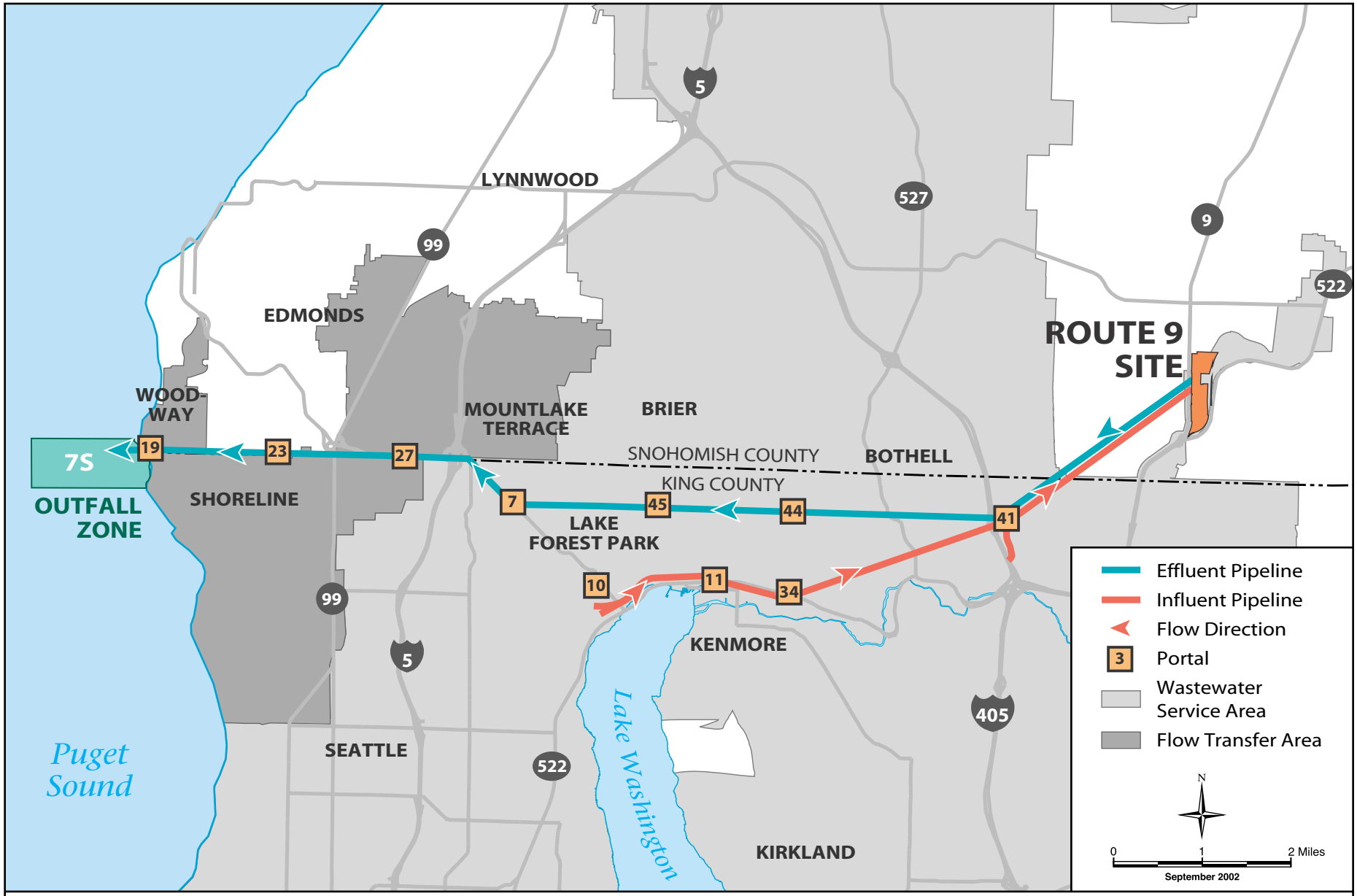
Figure 2-5

Candidate Treatment Systems Selected at the End of Phase 2-Site Selection, December 2001

BRIGHTWATER FINAL EIS



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Data Sources: King County GIS Data, **Note:** Pipeline widths not to scale

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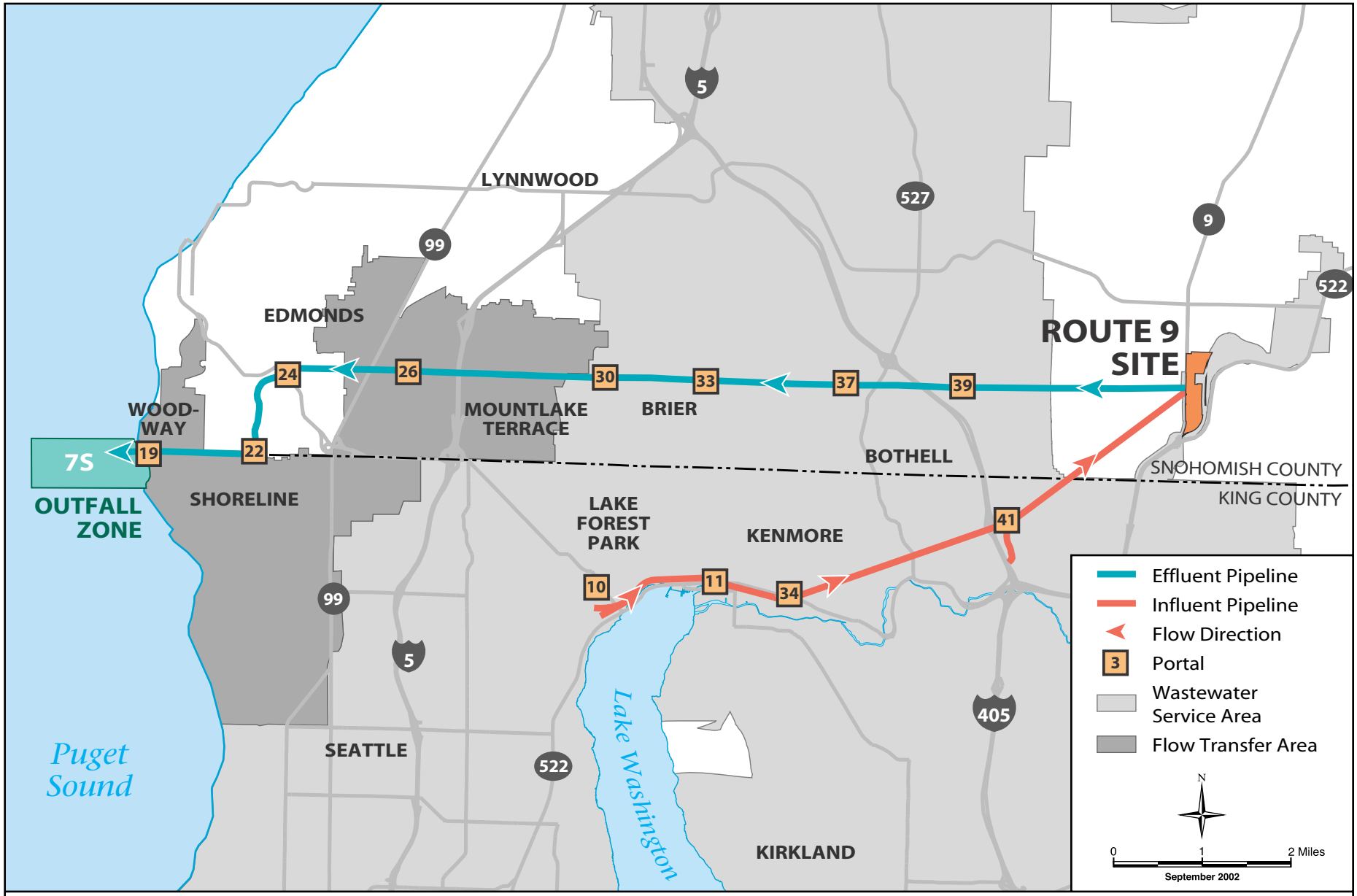
Figure 2-6

Route 9-195th System Alternative (Preferred Alternative) Evaluated in the Draft EIS

BRIGHTWATER FINAL EIS



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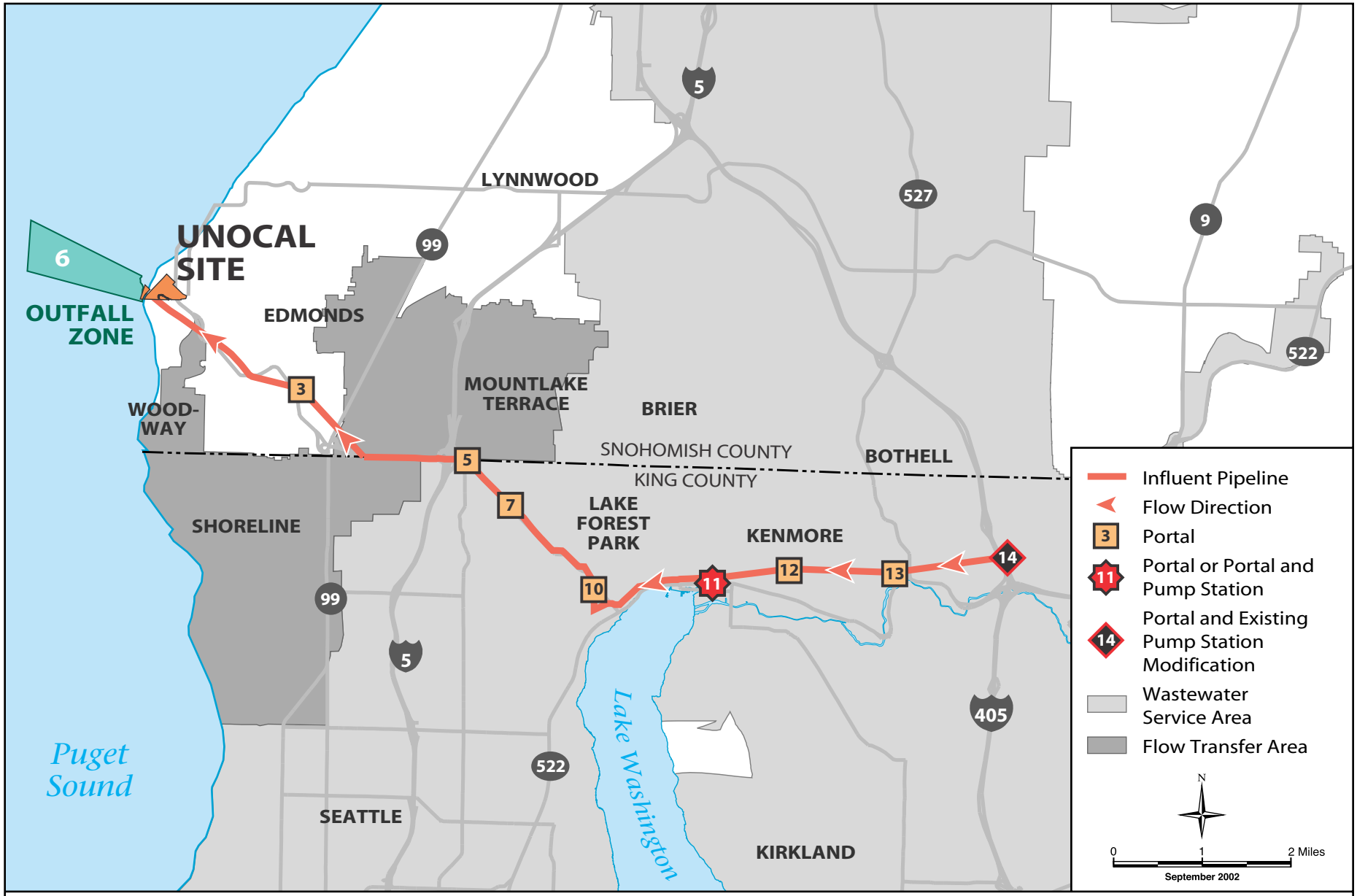
Data Sources: King County GIS Data, **Note:** Pipeline widths not to scale

File Name: 0209rt9_228ALTmapEIS.ai wgab

Figure 2-7

Route 9-228th System Alternative Evaluated in the Draft EIS

BRIGHTWATER FINAL EIS



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Data Sources: King County GIS Data, **Note:** Pipeline widths not to scale

File Name: FIG_02-08.ai wgab

Figure 2-8

Unocal System Alternative Evaluated in the Draft EIS

BRIGHTWATER FINAL EIS